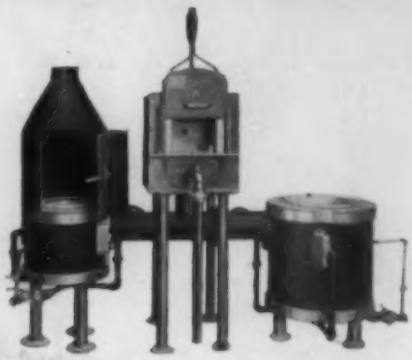
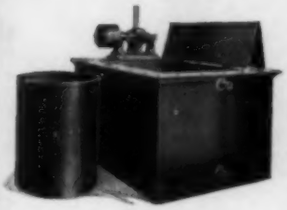
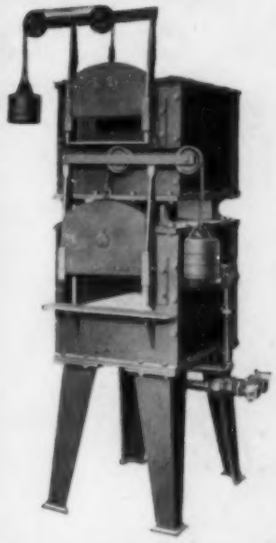
P.R.600

AUG 18 1916
UNIV. OF MICH. LIBRARY

THE IRON TRADE REVIEW

Single Copies 15 Cents | CLEVELAND, AUGUST 17, 1916 | Four Dollars a Year



BELLEVUE INDUSTRIAL FURNACE COMPANY

Manufacturers of

Commercial Furnaces

for all purposes

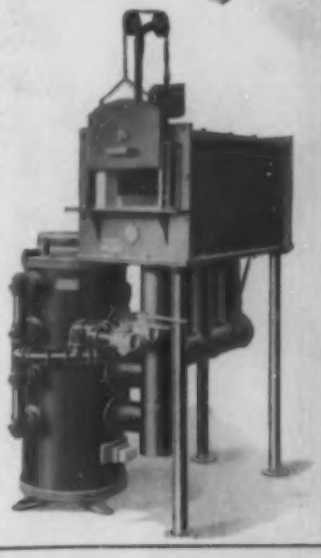
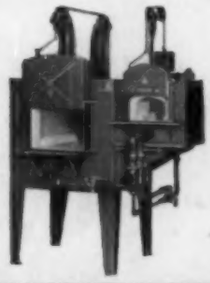
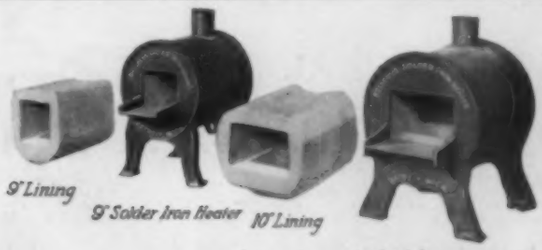
Kilns for firing Decorated Glass, China and Pottery

"Ask the man who uses them"

JULIUS C. HINZ, *President*

703-715 Bellevue Ave.

DETROIT .·. MICHIGAN




9" Lining 9" Solder Iron Heater 10" Lining 10" Solder Iron Heater

Alphabetical list of Advertisers, page 150. | Table of Contents, page 39. | "Where-to-Buy," page 102.
Opportunities, pages 145-146. | Second-Hand Machinery, pages 147. | Manufacturing Sites, page 148.
Fill-in and Contract Work, page 149. | Engineering Directory, page 136.

H. KOPPERS COMPANY

Builders of

By-Product Coke and Gas Ovens
Benzol Recovery Plants
Tar Distilling Plants
Direct Process for Manufacture of Ammonium Sulphate
Ammonia Stills

CONSULTING ENGINEERS

on the operation of

By-Product Coke Plants and Auxiliaries

FIRST NATIONAL BANK BUILDING
PITTSBURGH, PA.

Exhibitors at the Second National Exposition of Chemical Industries, Grand Central Palace, New York, Week of September 25th.

Say you saw it in THE IRON TRADE REVIEW

THE IRON TRADE REVIEW

Vol. LIX Cleveland, August 17, 1916 No. 7

Pig Iron Market Shows New Life

Inquiry for Basic, Malleable and Foundry From Domestic Melters—
Additional Contracts for Shell Steel Placed

ACTIVITY in pig iron, which recently was confined largely to buying for export, is now much more extensive, and in addition to large tonnages for export, the domestic demand is rapidly gaining in volume. The International Steam Pump Co. is now asking for from 35,000 to 40,000 tons of various grades for delivery all through next year. Other inquiries for foundry grades, some of which have been made very quietly, aggregate a large tonnage. In the St. Louis district, melters of basic are inquiring for 25,000 tons and throughout the country there is a disposition on the part of basic buyers to sound the market. Inquiry for malleable has also increased and it seems probable that there will soon be active buying of this grade.

The finished steel market is very strong and some of the largest producers now have made sales for delivery up to January, 1918. Many consumers are endeavoring to contract to midyear 1917.

Shell Steel

The buying of shell steel continues to be very lively and it may be conservatively estimated that several hundred thousand tons additional have been placed under contract during the past week. A Buffalo mill is understood to have received a large order for semi-finished material and independent mills of the Youngstown district are credited with having booked large tonnages. While the Steel Corporation has taken on additional tonnages, the transportations have not been as large as reported. Numerous contracts have also been placed with the steel plants by domestic manufacturers of munitions to cover recent orders for finished shells and forgings. The American Locomotive Co. has contracted for 75,000 tons divided among four companies. The Baldwin Locomotive Works has had some difficulty in placing its order for 26,000 tons, which will probably be taken up by an affiliated interest. In the making of the contracts many mills are looking forward to the period of peace following the war and are including a clause providing that if the material is not taken out in the form originally ordered, it must be taken in plates, shapes and bars, but some mills are executing iron-clad contracts requiring that the tonnage must be accepted in strict compliance with the original terms.

Iron Ore

The fact that one 7,500-ton vessel had been chartered to carry ore from the head of Lake Superior to Lake Erie ports next year at $1 net per ton, an increase of 100 per cent over the contract rate for this year, became known during the past few days and caused considerable stir, but it is not believed that this transaction, which was probably surrounded by special conditions, will have any important influence in fixing the prevailing carrying rate for next year. There is strong opposition even among vessel men to such a high rate. It would probably mean an advance in the price of ore to a basis of $5.50 for old range bessemer, a price regarded as too high by conservative interests, which favor an increase of 35 cents on ore and 15 cents on freight rates for next year.

Shapes and Plates

The Pennsylvania railroad has purchased about 10,000 tons of plates and from 2,000 to 3,000 tons of shapes for use in its Altoona shops. The demand for plates for ship building continues active and the plate market on the whole is extremely strong. A West Pennsylvania company has sold 15,000 tons of plain bessemer shapes for export. Contracts for structural material for new buildings aggregated the smallest tonnage in July of any month since February, 1915.

Pipe

Demand for steel pipe for the oil fields continues very active and several important projects are under consideration, in addition to those recently mentioned. Some manufacturers cannot promise delivery on oil country pipe in less than six to eight months. The market for merchant pipe is not nearly so active as that for oil country goods. Premiums are being paid on boiler tubes and seamless tubing.

THE OPEN HEARTH

Government Control in England

ON ACCOUNT of the almost world-wide tendency toward regulation and control of industries by government, a study of the experiences through which England has been passing since war was declared is timely and highly interesting. Elsewhere in this issue is printed a review by our correspondent in Birmingham, Eng., Joseph Horton, of the various policies which have been adopted by the government in controlling and regulating industries, particularly those connected with the manufacture of iron and steel.

In reading this review, one is deeply impressed by two features: The extreme difficulty encountered by the government in determining what maximum prices ought to be, and the patriotism of the people in submitting to the extraordinary policies and methods which were adopted. When the very life of a nation is at stake, the people can be depended upon to show the utmost patience when the ordinary pursuits of life are interfered with for what professes to be for the good of a great cause. Hence when the British government assumed control of practically all the steel works in the United Kingdom, the owners submitted gracefully, and as far as the operations of the plants were concerned, things went along about as usual. Radical changes resulted, however, in making shipments and in the control of the destination of products, government control was carried to the limit.

The regulation of exports of iron and steel has also been a prominent feature and has caused some complaint, but it has been in the fixing of maximum prices in iron and steel products that the greatest difficulties have been encountered and the greatest dissatisfaction aroused. While the government has freely consulted manufacturers as to what prices ought to be, it was characteristic of government interference that some men who know little, if anything, about manufacturing processes were employed in determining prices. Some striking inconsistencies have arisen, as, for example, when prices of pig iron and coke have not held the proper relation. Naturally a great deal of trouble was experienced in fixing prices of finished materials, and the determination of prices of high speed steels presented problems that were indeed puzzling.

In spite of the patience of the English people, many of the regulations have proved irksome and time has not increased the confidence of the people in the ability of the government to control and regulate manufacturing and selling.

As a general proposition, the action of the British government no doubt was fully justified, and the action of the United States congress in inserting in the recently passed army bill a provision giving the President almost unlimited power to assume control of manufacturing plants in the event of war, or even in case of war being imminent, has encountered very little opposition. People will submit to almost anything as a war measure, but the serious question in England today is what will be the effect of this government regulation and control after peace is declared. It may be that the experiment will convince many heretofore inclined to socialistic ideas that it would be extremely unwise to allow the government to continue permanently policies which have prevailed during the war period. On the other hand, it may safely be predicted that socialistic leaders will find some basis for argument in favor of their theories and will urge that the government continue its regulation and control of important industries. England will make a mighty effort to free herself from government control and the world will watch the struggle with the keenest interest.

More Truth About the Cuyuna

SOON after the European war was declared, it became apparent that there might be considerable difficulty in obtaining sufficient supplies of ferro-manganese to meet the requirements of the steel manufacturers of the United States. Stories of wonderful deposits of manganese ore in different parts of the country were widely published. Some of the most marvelous tales centered in the Cuyuna iron range in Minnesota, where it was said there were very extensive deposits of manganese ore, and if one had accepted the reports as to these deposits, he could easily imagine that on this range alone would be found enough ore to meet the needs of the United States. Prompt investigation made by the tax commission of the state of Minnesota disclosed the facts, and the commission announced that there was no manganese ore in commercial quantity, that is, no ore analyzing 40 per cent manganese, on the Cuyuna range. It was also stated that the so-called manganese ore is a manganiferous ore of uncertain value, most of it being too high in iron and too low in manganese for the manufacture of ferro-manganese or spiegeleisen. It was stated that when the manganese is found to be fairly high, the ore is so high in phosphorus and silica that it can not be used in making alloys. These statements were published in *The Iron Trade Review* and commented upon editorially in the issue of Nov. 26, 1914, under the caption, "The Truth About the Cuyuna". For a long time after, however, tales continued to be circulated con-

THE OPEN HEARTH

cerning the marvelous manganese deposits in the Cuyuna range.

Now comes the report of the United States Geological Survey for 1915, which has just been issued. It is written by D. F. Hewett, who for a number of years has published reports on iron ore deposits and is an authority on this subject. The report makes this statement:

"There are no ores on the Cuyuna range from which standard grades of ferro-manganese may be made. From those ores that are richest in manganese, spiegeleisen is now being made, but the high phosphorus ores cannot be used for this purpose."

This statement indicates the position taken by the Minnesota tax commission two years ago. It does indicate, however, that perhaps it has been found possible to make spiegeleisen to a larger extent than was believed at the time the tax commission investigation was made. The Cuyuna range was not the only part of the country from which marvelous stories concerning manganese deposits came, and an interesting feature of the government's report is the statement as to manganese ore mined last year, the total being only 9,709 tons. This is an increase of about 7,000 tons compared with 1914, but the manganese ore imported into the United States was 313,985 tons in 1915. Even under the pressure of tremendous demand and unprecedentedly high prices, the manganese ore mines of the country have been able to turn out a very small percentage of the ore of this grade used. It is noteworthy that Virginia in 1914 produced 1,724 tons and mined only 1,620 tons in 1915. Many states have small deposits of manganese ore, but reports of extensive discoveries should be received with extreme caution.

Work in Periods of Depression

THE outlook at the present time for a continuance of prosperous conditions for an indefinite period is highly encouraging, but the most optimistic observer will not be bold enough to predict that even with our federal reserve bank law, the future will not see periods of depression. Hence we believe that it is eminently fitting that while prosperity continues the country should be prepared to prevent such sad results of unemployment as have been experienced many times in the past.

Far-seeing employers have given much thought to this subject and some of them have favored insurance against unemployment, the necessary funds to be raised by contributions by employes when employed. While some arguments can be made in favor of this scheme, we believe that a better plan is that of giving employment to large numbers of men on public works during the periods when there are not jobs enough to go around in private plants. This idea is not a particularly new one, but it is elaborated upon and presented in an extremely interesting manner in the August number of *Everybody's Magazine* by William Hard, a writer who has given much study to industrial problems. Mr. Hard tells in considerable detail the works that might be well undertaken by the government. For example, he points out that after the last great flood in Pittsburgh in 1908, the Pittsburgh flood commission was appointed and its engineers went up into the mountains above Pittsburgh where they located sites for a large number of reservoirs, capable of holding back the waters of the next great flood and preventing them from desolating the Pittsburgh district. The cost of these reservoirs would be at least $25,000,000. The reservoirs planned to make impossible such a flood as that which did an immense amount of damage in the city of Dayton in 1913 would cost nearly as much as those for the Pittsburgh district. But, as Mr. Hard points out, Pittsburgh and Miami districts are very small in comparison with the whole Ohio river basin, and the cost of protecting the whole basin from floods would be according to estimates of the engineers of the war department, not less than $350,000,000, and it might be three times as much.

Extensive work in other parts of the country to prevent floods, drain some lands, irrigate others, and in many ways make the country richer, are described by Mr. Hard. If plans were made now for these extensive government projects, the army of the unemployed during the next period of depression would be reduced to a minimum. While, of course, financial conditions would be important, the money could be raised. If England can spend $30,000,000 a day in time of war, the United States can afford to spend very large amounts in time of peace to give men work. We believe that the most important problem connected with the plan would be perfecting it and its execution so that the work would be efficiently done under the direction of the ablest engineers in the country and guarded absolutely against any encroachment of the spoils politician.

As related by our Washington correspondent in this issue, Senator Harding has been asking some pertinent questions and making some important statements in regard to the shipping bill. That's right, senator, keep it up. Hit hard enough and the Great Lakes may be excluded from the most highly pernicious features of the bill, as has been done in the case of the rivers of the country.

Prices Present and Past

(Yesterday, a month ago, three months ago and a year ago.)

Quotations on leading products August 16, average for July, 1916, average for May, 1916, and average for August, 1915. Prices are those ruling in the largest percentage of sales at the dates named.

	Prices Aug. 16, 1916.	Aver. for July, 1916.	Average for May, 1916.	Aver. for Aug., 1915.
Bessemer pig iron, Pittsburgh	$21.95	$21.95	$21.95	$15.89
Basic pig iron, Pittsburgh	18.95	18.95	18.95	14.89
No. 2 Fdy. pig iron, Pittsburgh	19.45	19.45	19.325	14.70
Northern No. 2 Fdy., Chgo	19.00	19.00	19.00	13.40
Lake Superior Charcoal, Chgo	19.75	19.75	19.75	15.75
Mall. Bess., Chgo	19.50	19.50	19.50	13.40
Southern No. 2, Birmingham	13.50	14.00	14.95	11.00
Southern Ohio No. 2, Ironton	18.50	18.38	18.46	13.63
Basic, eastern Pa	19.00	19.25	20.50	15.25
No. 2X Virginia furnace	18.50	18.50	18.50	13.00
No. 2X foundry, Philadelphia	19.75	20.00	20.75	15.25
Ferro mang., Balti	170.00	175.00	175.00	105.00
Bessemer billets, Pbgh	45.00	40.00	44.25	23.00
Bess. sheet bars, Pbgh	45.00	40.00	44.25	24.00
Op.-h'th sh. bars, Pbgh	45.00	40.00	44.25	25.00
Open-hearth billets, Pbgh	45.00	40.00	44.25	24.00
Steel bars, Chgo	3.10	2.69	2.69	1.49
Steel bars, Pittsburgh, contr	2.60	2.50	2.50	1.30
Iron bars, Philadelphia	2.559	2.559	2.559	1.40
Iron bars, Cleveland, local del'y.	2.40	2.40	2.40	1.22
Iron bars, Chgo. mill	$2.35	$2.35	$2.35	$1.23
Beams, Chgo.	3.10	2.69	2.69	1.49
Beams, Pittsburgh, contr	2.60	2.50	2.50	1.30
Beams, Philadelphia	2.659	2.659	2.659	1.45
Tank plates, Pbgh., contract	3.00	2.86	2.75	1.30
Tank plates, Chicago	3.50	3.09	3.09	1.44
Tank plates, Philadelphia	3.909	3.909	3.909	1.45
Sheets, blk., No. 28, Pbgh	2.85	2.90	2.925	1.83
Sheets, blue an., No. 10, Pbgh.	3.00	3.00	3.02	1.36
Sheets, galv., No. 28, Pbgh	4.25	4.37	4.88	3.93
Wire nails, Pittsburgh	2.60	2.50	2.50	1.61
Connellsville fur. coke, contr	2.40	2.42	2.60	1.75
Connellsville fdy. coke, contr	3.15	3.15	3.50	2.25
Heavy melting steel, Pbgh	16.00	16.25	17.125	13.38
Heavy melting steel, east'n Pa	15.00	15.25	17.00	13.50
Heavy melting steel, Chgo	14.25	14.15	16.50	11.50
No. 1 wrought eastern Pa	20.00	19.75	22.75	15.00
No. 1 wrought, Chgo	15.25	14.00	16.35	10.12
Rerolling rails, Chgo	15.50	15.70	17.25	11.75
Car wheels, Chgo	12.00	12.25	13.15	11.40

(For Additional Prices See Page 346.)

Decided Increase in Pig Inquiry

Large Consumers Show Much More Interest—Basic Melters Sounding the Market—Active Inquiry for Bessemer and Malleable

New York, Aug. 15.—A much heavier inquiry for pig iron aggregating well over 100,000 tons has appeared in this district from both domestic and export buyers and this seems to be spreading. At least 60,000 tons of this are for home use. The larger consumers are showing signs of being more concerned over their future requirements and a number of them are watching closely and sounding out the market. The furnaces, as a rule, are standing firmly by their schedules for forward shipment as higher prices are a common expectation and any shading at present is confined to early deliveries. The largest domestic inquiry comes from the International Steam Pump Co., which now is in the market for 35,000 to 40,000 tons of various grades for all 1917 shipment. This company in the week issued an inquiry for last half of next year, which duplicates the one for first half circulated the previous week. A newly organized company known as the Hess Steel Corporation which will operate under lease the old Titan steel casting plant in Newark has come out for 11,000 tons of basic for the next several months. Leading Connecticut malleable interests are out for 3,000 to 5,000 tons of malleable for this year and next and may purchase heavily. A railway equipment maker has asked for 3,000 to 3,500 tons of different grades for a southern plant. Other inquiries are current. The export market has brought out new requests for some large tonnages. A prominent New York house has asked for 30,000 tons of bessemer, presumably for France. A large engineering firm has inquired for 1,000 to 5,000 tons each of eight or nine different grades of which six are foundry, one bessemer, one low phosphorus and one charcoal. This also is believed to be for France. Italy this week asked 6,000 to 12,000 tons of bessemer and low phosphorus, 5,000 tons of southern and 2,500 tons of northern foundry. Norway wants 1,000 tons and Sweden 500 to 1,000 tons of foundry. Export sales are few compared to the inquiry. Freights are rising and $35 to the Mediterranean from either northern or southern ports is quoted for forward positions.

Foreigners Want Bessemer

Pittsburgh, Aug. 15. — Heavy inquiry exists for bessemer pig iron for shipment abroad. A few days ago negotiations were opened for 30,000 tons of standard bessemer iron for export shipment probably to England. Pig iron sellers have been asked to quote on 20,000 tons of the same grade for shipment to France and representatives of Italy are endeavoring to buy 10,000 tons of bessemer pig iron. It is difficult to estimate accurately how much tonnage is wanted for export, on account of the duplication of inquiries.

Bessemer pig iron is being held at $21, valley, for domestic delivery, although some tonnage for export has commanded 50 cents a ton above that figure. The market from a purely domestic standpoint is quiet. Pig iron producers, however, believe that a buying movement is not far distant. Scarcely any iron has been sold for shipment next year. Blast furnace managers do not know at present whether they will be able to obtain sufficient quantities of ore to meet demands until the opening of the lake navigation season next spring. The threatened strike of railroad company employes has tended to make sellers more conservative than ever. Prices of pig iron are unchanged. No. 2 foundry and malleable iron are being held at $18.50, valley. Some southern iron has been purchased by consumers in this district who have been tempted by the comparatively low prices offered in the south.

Inquiry for Basic

St. Louis, Aug. 14.—The pig iron situation here was brightened today with the appearance of an inquiry for 10,000 tons of northern basic, and local sales agents are on

(*For complete prices see page 346.*)

the alert to secure it. Half a dozen inquiries for car load lots of northern and southern iron also were received. Sales last week were confined to small lots, one of which was 500 tons of northern foundry iron. Prices are firm, and southern iron is held at $14, Birmingham, for delivery over the year. This price could be shaded for resale iron, but there is not as much of that commodity on the market as there was a short time ago. Northern iron is offered at $18.50 to $19, Ironton, and $19, Chicago.

Broader Inquiry, Few Sales

Philadelphia, Aug. 14.—A broader inquiry but no appreciable increase in sales are the outstanding features of the pig iron market in this district. In view of the numerous holdups of iron shipments from the furnaces by consumers because of a lack of labor, it is suggestive of the fundamental strength of conditions that more metal is being delivered from the eastern Pennsylvania district than is being produced at the present time. Furnace stocks accordingly still are shrinking. Prices in the prevailing market are unsettled and may not be quoted positively because testing sales are so few. There continues to be more quiet stirring among buyers of basic. An inquiry from a new New Jersey consumer calls for 11,000 tons for the next four or five months. A Cumberland, Md., maker wants 1,000 tons of prompt iron and an Eddystone, Pa., plant 500 tons, also for quick delivery. Other basic users are sounding the market and there is some talk that the largest eastern consumer again may be a buyer soon though this company is covered for the remainder of the year. One maker has been quoting basic at $19.50, delivered. Various new foundry iron inquiries have come out, most of them for less than 1,000 tons. A Newport News, Va., shipbuilder wants 600 tons of several grades for October-November delivery. An eastern Pennsylvania inquiry for 2,000 tons of bessemer ferro-silicon for all next year is current. Another inquiry from a Philadelphia middleman is for 1,000 tons of 3 per cent silicon iron. Eastern Pennsylvania No. 2 remains around $19 at the furnace. Reports of price concessions in Virginia iron continue, but it is not clear whether these apply to resale or to furnace metal. The leading Virginia makers have not changed their schedules. Low phosphorus sales are few, as eastern makers have little to offer for the year. Export inquiry is active, but sales in this territory have been few. Several tonnages of special bessemer are under negotiation.

Buying Movement Starts

Buffalo, Aug. 15. — The anticipated buying movement calculated to develop about the middle of next month has appeared fully a month ahead of that time. All of the furnaces of the Buffalo district report increasing activity and sales for the week that have aggregated into large tonnages to meet the requirements of melters for last half of this year and first half of 1917 needs. There is little or no distinction being made in the matter of prices for such tonnages as are available for this year's demand and for the iron for delivery up to July 1st of next year. As far as prices go, both periods have been merged.

On the basis of the rate of consumption of iron ordered out under contract by the melters, it is estimated that a considerable tonnage will have to be covered for the remainder of the year and also that the surface has hardly been scratched as far as the first half buying is concerned.

All of the producers of this district are confident that the market is entering upon a buying movement that is more than likely to assume unprecedented proportions. Large tonnages are under negotiations and more are appearing from all parts of the territory served from this district.

While the furnaces had been marking time for weeks at a range of $18 to $19, it looks as though the bottom price has been reached. Consumers are being advised by wire that all previously quoted schedules have been withdrawn and that a general revision of schedules is under way. Some of the producing interests are disposed to hold off quotations for the next 30 days, being sold up to such an extent that they can easily await developments before committing themselves in the matter of remote deliveries. The minimum for the immediate present is $18.50 to $18.75 and a range of $18.50 to $20 covers such prices as are obtainable for all grades. No. 2X foundry is being quoted at $19 to $19.50 and the higher silicon grades at $19.50 to $20, while only the lower grades are obtainable at less than $19.

Large users as well as numbers of melters generally are coming into the market for their first quarter and first half needs for the coming year. One consumer that sent out an inquiry for 18,000 tons, as previously reported has practically doubled his inquiry, now seeking to secure 35,000 tons of foundry grades. There is also an inquiry for 25,000 tons of steel making iron, little or none of which can be cast before the first of January.

Shipments of iron under contract continue to be heavy and all indications of a weakening in the iron market have disappeared.

(*For complete prices see page 346.*)

More Activity, Prices Firmer

Birmingham, Ala., Aug. 14. — The Birmingham market has had a fair-sized "deluge" of inquiries the past week for pig iron, both for domestic and foreign delivery. Between 30,000 and 40,000 tons have been sought, more than half of which was for export. The lowest quotation obtainable was $15 per ton f. o. b. Birmingham on such business that could be cared for. The taking on of additional export tonnage has been hampered for lack of boat facilities—the uncertainty of arrival of boats to take on cargoes. Storage facilities at ports are exceedingly limited, and for that reason no considerable tonnage of iron can be held pending the arrival of boats, and the demurrage charges exacted by railroads preclude the holding of iron in cars. However, so eager have been some of the foreign interests for steel that they have agreed to pay for steel that may be piled on plant yards, treating such procedure as deliveries.

Quite a tonnage of steel is being piled in the district in this way, and it is understood that certain foreign interests are arranging for a regular two to three boat service per week through New Orleans for the regular handling of southern materials. The activity in steel the past week has been exceedingly brisk, large orders for different classes of steel having been turned down. The Tennessee company has largely increased its sales of Tennessee special tool steel, both for domestic and export delivery.

The proposed advance of $2.24 per ton on pig iron freight from the district to Pacific coast points has aroused considerable apprehension on the part of shippers in their solicitude for buyers who may wish to take advantage of anticipated shipments of their iron. A delegation of pig iron interests has left for Washington to use its good offices with the interstate commerce commission in an attempt to get the time limit extended two to three months in order to relieve buyers as much as possible.

Basic Inquiry Comes Out

Chicago, Aug. 15.—Inquiries for basic iron by melters in the East St. Louis district form the feature of the present market. Three consumers there are asking for a total of 25,000 tons in lots of 5,000 to 10,000 tons. Should this business be closed with northern makers, it would do much to strengthen the market in this district and would go far toward bringing out a higher level of quotations.

Demand for bessemer iron for export continues and sufficient is said to be offered to absorb the possible production

until the end of first quarter of next year. Two stacks in this territory are working on this grade at present. Some inquiries which could have been closed failed of completion because of inability to obtain vessels in which shipment could be made. The iron now being turned out is exported by way of New York.

Foundry inquiries are not large, although demand and sales are on the increase from the almost irreducible minimum of business that prevailed a few weeks ago. The growth of the buying movement is steady and gradual and promises much for the market late in the year.

Prices on foundry and malleable remain steady at $19, and $19.50, furnace, respectively. Sales of off iron have given rise to rumors of shading, but these can not be verified.

Southern iron is not active and little inquiry is out. While most makers ask $14.50 for last half and $15, Birmingham, for first half, one Tennessee stack is said to be willing to take additional tonnage at $13.50, Birmingham, for either delivery.

Charcoal iron is in good demand and sales of 500 to 1,500 tons have been made recently at the quotations that have prevailed for some time. Jackson county silveries are quoted at $29.50, delivered, Chicago, for 8 per cent, but little business is being done in this grade. Bessemer ferro-silicon is obtainable at $30, furnace, for 10 per cent.

Basic Sale Reported

Cincinnati, Aug. 15. — It is rumored that a nearby rolling mill has purchased between 40,000 and 50,000 tons of basic iron for last quarter and first half shipment. The Andrews Steel Co., Newport, Ky., which was reported to be out for 30,000 tons of basic iron, is not contemplating buying at present. Sales of foundry iron are limited to a few scattered carload lots. The Laidlaw-Dunn-Gordon Co., this city, has not purchased the 2,000 tons of foundry iron, mentioned last week, for which it has been in the market for about 10 days. A Michigan user is asking for 1,000 tons of charcoal iron for first half of next year, and the American Brake Shoe & Foundry Co., is out for about 3,000 tons of charcoal iron for its St. Louis and southern plants. An inquiry for 3,000 tons of malleable iron from Toledo, O., which was reported last week, is still open.

One southern stack continues to offer No. 2 foundry iron at $13.50, Birmingham basis, for the last half of this year and the first half of next year, and resale iron is also obtainable at that figure. The majority of stacks in the south are asking from $14.50 to $15, Birmingham basis, for any shipment over this year, and the first half of 1917. Southern Ohio No. 2 foundry iron is quoted at $19, Ironton basis, for 1916 and the first half of 1917. Southern Ohio silvery iron is quoted at $26, furnace, for 8 per cent silicon, and the same grade from the south can be had at $24, furnace, both for last half shipment.

Heavy Inquiry Pending

Cleveland, Aug. 15.—A general disposition is manifested on the part of steel manufacturers not having their own pig iron to sound the market on both basic and bessemer. The pending inquiries involve a large tonnage. There is also a very fair inquiry for malleable, including one for 5,000 tons which comes from the east. Foundry iron is quiet, but one important buyer is understood to be quietly sounding the market.

Warehouse Prices

Show Some Irregularity — Keen Competition From Detroit Jobbers

Cleveland, Aug. 15.—Warehouses are having considerable difficulty in replenishing their stocks. The demand is active, but the prices are somewhat irregular, as very keen competition has developed, especially with Detroit jobbers, some of whom are cutting the market. It is evident that some jobbers accumulated large stocks which they are willing to sell at a fair profit even if the quotations are below the ruling prices.

Demand For Structurals

Cincinnati, Aug. 15.—The best demand for warehouse materials is for light structurals, with twisted reinforcing a close second. Warehouses are disposing of their stocks almost as fast as they receive shipments from the mills. Cold rolled bars are quoted at 10 plus the list price, hot rolled bars from 3.20c to 3.70c, and plates and shapes from 3.20c to 3.50c, all f. o. b. Cincinnati.

Nuts, Bolts and Rivets

Pittsburgh, Aug. 15.—Manufacturers of nuts, bolts and rivets have bought heavy tonnages of steel bars at 2.50c for future shipment, but it is not unlikely that prices of nuts, bolts and rivets will be put up at an early date. Structural rivets are being held at 4c and boiler rivets at 4.10c for shipment at the convenience of the manufacturer.

About 80 machinists and helpers at the plant of the Maxim Munitions Co., Derby, Conn., are out pending an adjustment of differences which have arisen over the discharge of a number of night workers.

(*For complete prices see page* 346.)

Ferro Shipments

To This Country Not so Heavy—British Admiralty Watchful

New York, Aug. 15.—Some licenses for August shipments of English ferro-manganese to this country now have been granted to the makers by the British government, but the tonnage so far released is much less than was brought in during other recent months. The holding back of August licenses by the British authorities has been the occasion for some apprehension in the trade, as it has been feared that the British admiralty may not be so liberal in permitting shipments as during the past three or four months. In fact, some of the makers yet are without August licenses and those who have been granted permission to ship this month brought in very little metal last month, and in some cases none at all. Indications are that the British authorities again are watching closely the stocks on hand and are conserving them more diligently.

A fair amount of miscellaneous new inquiry for ferro-manganese for domestic consumers here, for prompt and nearby shipment, is in the market. This aggregates about 1,000 tons, including 300 tons for a New Jersey works, 300 tons for a buyer in the Pittsburgh district, a little for southern Ohio, some for New England delivery, and other scattered lots. There also continues current various inquiries for export. The price limits of the market are uncertain owing to the light amount of new business, but from $170 to $175 at seaboard or furnace is regarded as expressing the situation.

Export inquiries are about all that are active in spiegeleisen. The market continues at $45 to $50, furnace, for 20 per cent. Considerable foreign demand for bessemer ferro-silicon also is being maintained. Several hundred tons additional have been closed making recent export sales not less than 2,000 tons. France has been the leading buyer. An eastern Pennsylvania consumer is inquiring for 2,000 tons of 10 per cent ferro-silicon for all next year.

Alloys Quiet and Irregular

Pittsburgh, Aug. 15.—The market for ferro-alloys, although quiet, is somewhat irregular. Spiegeleisen continues to be held at $50, furnace, by some sellers, but material recently has been offered at $45, furnace, and it is understood that that figure has been shaded in isolated instances. Eighty per cent ferro-manganese is selling at a range from $170 to $175, seaboard. Demand for this alloy is light. Lower grades of ferro-silicon have been offered at about $3 a ton under prevailing nominal quotations, but no trace of any actual sales can be found.

Many Would Buy Bars

Manufacturers and Jobbers Anxious to Make Contracts— Some Willing to Pay 2.60c, Pittsburgh

Philadelphia, Aug. 14.—Hurried efforts of numerous buyers, including both manufacturers and jobbers, to place steel bar contracts for last half of the year and first half of next continues to illustrate the change of mind that has come to various companies and firms since the latest price advance was announced. Much contract tonnage now is being offered by these buyers and some of the latter show willingness to pay 2.60c, Pittsburgh, or 2.759c, Philadelphia. While it is apparent that a good many contracts were accepted at 2.50c, Pittsburgh around the time of the advance, some of the mills now are moving slowly in making further committments. This applies especially to some of the independents. Specifications also are more active and high-priced contracts now appear to be more attractive to the buyers. The Pennsylvania railroad has been the buyer of several thousand tons of bars for first half of 1917 for Altoona. A locomotive builder closed for about 1,200 tons of 3¼-inch flats and 5⅜-inch rounds. There has been a new inquiry in the market for 4,500 tons of 6⅜-inch rounds from an eastern Pennsylvania buyer, but it is learned that this is included in the 26,000 tons of this size asked for by the Baldwin Locomotive Works, a week ago. This large order still is pending, but the indications are it will be placed with a large maker having mills both in the east and in western Pennsylvania. An export sale of the week placed by a dealer here was for 2,000 tons of bessemer bars for England, which went to a western Pennsylvania producer.

Steel Bars Active

Pittsburgh, Aug. 15.—Heavy tonnages of steel bars are wanted for the manufacture of shells for shipment to Europe. An eastern Pennsylvania munition maker recently sent out inquiries for from 25,000 to 35,000 tons of 6⅜-inch rounds. The American Car & Foundry Co. continues to be an active factor in the shell steel market. Pending inquiries, many of which are indefinite, involve fully 50,000 tons. Rounds for shell steel now are being held at a range from 3.75c to 4c per pound. Some tonnage recently was sold at 3.50c.

The domestic market is fairly active. The recent advance of $2 a ton seemed to stimulate activity. Agricultural implement concerns have bought rather heavy tonnages, and nut, bolt and rivet manufacturers are figuring in the market. Some material has been sold at the new price, 2.60c, but most of the contracting has been done at 2.50c. Iron bars are being held at 2.65c as a minimum.

Expect Scramble for Bars

Chicago, Aug. 15.—With each week making the situation for finished steel products more complicated, many steel men believe that within a short time domestic consumers who have refrained from covering their requirements for first half find themselves shut out, and a scramble for material will result when it is too late to obtain supplies, or at least to obtain as much as consumers will desire. Larger mills which make contracts far into the future have been holding back on export contracts to give domestic consumers every opportunity to obtain what they desire. This demand has been slow and buyers apparently have not appreciated the tremendous pressure on mills which has been resisted until domestic needs were taken care of.

This export business demands a high price, in some instances double the returns obtained from material delivered in this country. The situation now has reached a point where mills are practically willing to take on all the export business they can handle, believing they have dealt as fairly as possible with the backward American buyer.

Soft steel bars are quotable for contract at 2.79c, Chicago mill, with limited tonnages available from larger mills, and considerable premiums are asked by smaller mills which sell only for prompt delivery.

Hard steel bars are in moderate demand, which keeps mills in a comfortable state with 60 to 90 days' business on the books. The quotation is 2.50c, Chicago mill, with some premium for a few of the smaller sections.

Contracting Freely

Cleveland, Aug. 15.—Agricultural implement manufacturers are contracting freely for their requirements for the first half of next year at 2.50c, Pittsburgh. In fact, practically all of these buyers in the Cleveland district have covered. Specifications against bar contracts are coming in liberally and the general situation is regarded as very strong.

Bar Iron Steady.

Chicago, Aug. 15. — With a steady volume of new business offering from week to week, makers of bar iron find their future production well cared for. Some mills are sold practically through the remainder of the year, while others have some tonnage yet to dispose of, and are not selling much more than 60 days in advance.

The quotation is 2.35c, Chicago mill, and it appears that this figure is likely to cover all bar iron produced and sold up to the first of next year. No indications are apparent now that lead to expectation of a higher level prevailing before that time.

(For complete prices see page 346.)

Shafting

Pittsburgh, Aug. 15.—Pittsburgh manufacturers are asking from 20 to 15 per cent off the list for cold rolled steel shafting for shipment at their convenience. No tonnage has been sold for 1917 delivery, although many of the orders now held by mills will not be filled until after the end of this year. According to several makers, quotations below 15 per cent off the list gradually are disappearing.

Cotton Ties

Pittsburgh, Aug. 15. — Mills in the Greater Pittsburgh district have rolled practically all the cotton ties they will furnish this season. Heavy tonnages have been shipped to southern warehouses and it is believed that cotton growers will have no difficulty in obtaining all the material they require for baling their crops this year.

Hoops and Bands

Pittsburgh, Aug. 15. — Most manufacturers are refusing to shade 3c for hoops and 2.60c for bands, although published minimum prices have not entirely disappeared. Specifications against contracts are heavy; new buying is comparatively light, but this is not surprising, in view of the fact that mills have sold their output for the remainder of this year.

New Plant Making Steel

Partial operations have been started in the new plant of the Hess Steel Corporation, Baltimore, manufacturer of electric steel. One of the 6-ton heroult furnaces now is producing, and its output consists almost exclusively of alloy steel, including chrome, chrome-nickel, and nickel. This material is being rolled through sizes ranging from ⅜-inch rounds or squares up to 5-inch rounds or squares. Rolls for special sizes are being gradually added to the plant equipment. The melting capacity of the plant is approximately 900 tons per month. The mills are capable of handling more than twice this tonnage at the present time.

Sheet Demand

Extends Into Next Year — Mills Not Ready to Contract

Pittsburgh, Aug. 15.—Anxious consumers of steel sheets are trying to buy material for shipment next year, but, so far as can be ascertained, none of the sheet mills in the Greater Pittsburgh district has opened books for delivery after Dec. 31. It is not likely that manufacturers will accept tonnages for delivery next year for at least three or four weeks. It is not known at present what sheet bars will command for delivery the fourth quarter of this year and the first quarter of next year.

The domestic market for black, blue annealed and galvanized sheets shows no change in position. Tin mill black sheets are decidedly scarce and manufacturers can obtain almost any price they care to ask for tin mill sizes. The heavy demand for tin plate has made it difficult for tin mills to roll sheets. No. 28 gage black sheets are being offered at as low as 2.75c and No. 28 gage galvanized sheets are being obtained at 4.25c; occasional reports of those figures being shaded are heard. Blue annealed steel sheets are being quoted at 3c as a minimum for No. 10 gage.

Little Buying This Year

Philadelphia, Aug. 14.—Buyers of heavy sheets in eastern territory appear to be well covered for this year. Makers likewise have little free tonnage. Current sales accordingly are limited to moderate lots, as there is no contracting for next year at this time. Small lots have commanded 3.50c, Pittsburgh, or 3.659c, Philadelphia, for No. 10 gage blue annealed. The usual quotation for forward shipment is around 3.00c, Pittsburgh, or slightly more.

Sheet Market Quiet

Chicago, Aug. 15.—Although sheets now being rolled are from sheet bars costing considerably more than was the case during the first half of the year, prices have not yet advanced from previous level. Demand for black and blue annealed sheets remains steady without particular feature. Prices are somewhat irregular, as stocks in the hands of some jobbers are being offered at concessions sufficient to unsettle the market somewhat.

Some indications are seen that the market will strengthen shortly, and no apprehension is felt over the peculiar situation. Galvanized sheets are available at 4.20c to 4.40c, Chicago mill, with moderate demand.

Improvement Expected

Youngstown, O., Aug. 15.—Manufacturers are expecting an improvement in the demand for black sheets, which at present continues at the same uncertain level that has prevailed during the past few weeks. The situation is such that it is difficult to quote prices that adequately represent the market. The margin of profit in black sheets is so low that manufacturers have no inducement to go actively after business of this kind, and as a result the prices now current are more or less nominal. Most of the sales now being reported are made on a basis of 2.85c or 2.90c, although a number of transactions at a slightly higher figure are said to have been made. A few lots of odd sizes have been disposed of at 2.75c. The export demand for light sheets is extremely light, due it is said, to the fact that foreign consumers bought unusually large stocks some time ago, when prices were lower.

Galvanized sheets are still selling at the minimum of 4.25c to 4.30c, with prospects for a slight increase, if spelter prices continue to strengthen. The demand for the galvanized product is comparatively light at present, but several manufacturers are of the opinion that a sharp rise in the price of spelter might precipitate a buying movement. The roofing trade has not figured in the market to any great extent.

A strong domestic demand, together with an encouraging amount of export business marks the market in blue annealed sheets. In widths of 48 inches or over, the demand is especially strong, and mills are unable to take all of this kind of business in sight. The prices for the more desirable widths are slightly above the 3c minimum. Several mills have started to book orders for the fourth quarter and practically all have made disposition of most of the third quarter production.

Quotations Lack Uniformity

Cleveland, Aug. 15.—On blue annealed sheets, less is heard of extremely low prices reported in eastern territory, but quotations are lacking in uniformity and concessions are rather freely made on narrow widths. Mills are disregarding the Pittsburgh base to a considerable extent and are quoting considerably below the usual Pittsburgh prices when it is necessary to take business.

Tin Plate Continues Strong

Pittsburgh, Aug. 15.—The market for tin plate in western Pennsylvania and eastern Ohio continues strong. Specifications against contracts are heavy and many consumers are trying to buy additional tonnages for shipment this year. Many mills will not be able to fill their obligations until after Dec. 31. It is not known at this time how much tonnage will be carried into 1917, but indications are that unfilled orders at the end of this season will be much larger than usual. Tin plate nominally is quoted at $6, base.

(For complete prices see page 346.)

Cast Iron Pipe

Heavy Demand For Odd Lots Has Developed in Month

Birmingham, Ala., Aug. 14.—The manufacturers of cast iron pipe report an exceptionally heavy demand for odd lots of pipe from different sections of the country, due to the rush of interests in taking advantage of the seasonable weather. There have been no sales made of heavy tonnages, but comparatively little pipe is being piled saved the regular quota to keep up stock sizes. The American Cast Iron Pipe & Foundry continues to run its double shift, with output of from 300 to 350 tons each 24 hours. Prices are unchanged as follows, per net ton, f. o. b. cars at plants: Four-inch, $28; 6-inch and up, $25, with $1 per ton extra for gas pipe and 16-foot lengths.

Eastern Contracts

New York, Aug. 15.—R. D. Wood & Co. have been awarded the 2,000 tons of 6, 8 and 10-inch cast iron pipe for Panama. Richmond, Va., has taken bids on 1,600 tons of 6 to 30's. A recent contractor's letting at Red Creek, N. Y., calls for 300 tons of 6's and 8's. A contractor's requirement for the borough of Richmond of 170 tons of 12-inch will be bid upon Aug. 17. Bids are coming out for 600 tons of 30's and 36's for contractors for Perth Amboy, N. J. Export inquiries for pipe are quite plentiful, but apart from those for Cuba few of these are being closed. Public lettings in pipe remain rather few but the private buying holds up well. Prices are steady.

Pipe Sales Light

Chicago, Aug. 15. — Business in the cast iron pipe market continues to be moderate, and tonnages now being sold are small. The United States Cast Iron Pipe & Foundry Co. is low bidder on 300 tons at Lincoln, Neb.

Charles R. Putnam, superintendent of the Waukegan plant of the American Steel & Wire Co., was severely injured Aug. 13 when his automobile was struck by an interurban car on the tracks of the Chicago & Milwaukee Electric railroad. Mrs. Putnam was instantly killed, as the tonneau in which she was seated was crushed beneath the car.

Plates for Shop Needs

Purchased by the Pennsylvania Railroad – Market is Strong and Active—Mills Bid on Tonnage for Export

Philadelphia, Aug. 14.—A considerable purchase of plates for Altoona shop needs, delivery over the first half of 1917 and estimated at 10,000 tons or more, has been closed by the Pennsylvania railroad. Leading Pittsburgh and eastern Pennsylvania makers divided the order which was made up of both tank and universal qualities. For the tank steel 2.90c to 3.00c, Pittsburgh, was paid and somewhat more for the universals. Some eastern mills quoted 4.00c, Pittsburgh, for the tank plates, which continues to be their regular price. The plate market is continuing very strong and active. Some of the eastern shipyards are carrying on negotiations for round lots. Export demands keep up to a high pitch. Eastern mills are bidding on a new offering of 4,000 tons for export and another of 1,500 tons. Some eastern Pennsylvania makers are accepting 3.00c to 3.25c, Pittsburgh, for a limited range of widths for first half of next year, meeting the Steel Corporation quotation, but they ask 3.50c, Pittsburgh minimum, for early delivery. Other eastern mills are standing by 4.00c, Pittsburgh, on tank steel for any delivery they can make, which usually is many months away Specifications are reported to be keeping up heavily.

Plates Held at 3c

Pittsburgh, Aug. 15.—Although railroads have not been buying many new cars recently, they have been taking heavy tonnages of car material for repair work. In the aggregate, thousands of tons of plates and shapes have been purchased recently for rebuilding and repairing cars. It is not likely that railroad purchasing agents will figure in the market actively until after the threatened labor trouble has been settled.

Steel plates for fairly prompt delivery are being held at a range from 3.50c to 4c, at which range rather heavy tonnages have been sold recently. For delivery at their convenience, manufacturers are having no difficulty obtaining $3, the price adopted a week ago.

Strong Plate Demand

Chicago, Aug. 15.—Demand for steel plates, especially for ship building purposes, continues unabated, and even at the advanced price, 3.19c, Chicago mill, buyers do not hesitate to close for such tonnages as they can obtain for delivery during first half of 1917.

In addition to the large tonnage going to the Pacific coast of which mention was made last week, another lot of ship building material aggregating close to 25,000 tons have been sold for use on the Pacific coast.

Foreign ship builders are also anxious to obtain supplies in this country for which a much higher price is available than is being collected for domestic use. Renewed activity on the part of railroads in placing orders for freight cars is another factor adding much strength to the finished steel situation.

Ore Freight Rate

Is Being Discussed — Strong Opposition to Pay $1 Net

Cleveland, Aug. 15.—The chartering of one 7,500-ton vessel to carry ore throughout the season of 1917 at $1 net caused considerable stir in vessel and iron ore circles during the past week, but it has developed that the contract was made about two months ago and there is strong evidence that there was a "string" attached to it. Hence this transaction is not regarded as in any sense affecting the market for next year and the prevailing opinion is strongly against a $1 rate on ore. The present season's contract rate is 50c and even vessel men are willing to admit that an advance of 15 cents would be adequate for next season. Ore men feel that there ought to be a moderate advance in the price of ore for 1917 delivery, but they do not propose to give all of this advance to the vessel owners. A strong conservative element believes that an advance of 15 cents on the ore-carrying rate and 35 cents on ore ought to be the limit of advances. Some vessel tonnage for 1917 has been chartered, but the contract rate is not yet established and there is no disposition to force the establishment of the rate.

The strike at the Superior coal docks was broken some days ago and the general labor situation on the lakes shows a decided improvement. There is a better supply of sailors and dock hands than for some time. The men, as a rule, are of higher grade.

Offered at Advance

Philadelphia, Aug. 15.—About 40,000 tons of old range ore for fall delivery are being offered to eastern consumers at a considerable advance over the prevailing official schedule. For old range bessemer $5.20 at lower lake ports, an advance of 75c, and for old range non-bessemer, $4.20 at lower lake ports, an advance of 50c, are being asked. The ore is being offered for delivery during September, October and November.

(*For complete prices see page 346.*)

Oil Country Pipe

Is in Active Demand — Number of Projects are Pending

Pittsburgh, Aug. 15.—Demand for lap-welded pipe continues decidedly heavy. A number of pipe line projects are under consideration, in addition to those mentioned a week ago, and it is likely that several additional orders will be placed in the near future. Some manufacturers are unable to promise oil country goods for delivery in less than from six to eight months.

Recent declines in the price of crude oil have failed to greatly affect the development of new properties. Pennsylvania crude oil has declined from $2.60 to $2.30 a barrel, or 30 cents a barrel; Oklahoma crude oil has registered a decline of 50 cents a barrel. Prevailing prices, however, are approximately $1 a barrel above those quoted a year ago.

The market for merchant pipe is not nearly so active as that for oil country goods, but indications are that heavy tonnages of butt weld material soon will be wanted for autumn distribution. Boiler tubes and seamless tubing continue to command primium prices in many instances.

Higher Coke Prices

Pittsburgh, Aug. 16.—Several tonnages of blast furnace coke for immediate shipment have been sold the last two days at $2.85, ovens, and some cokemakers are refusing to shade that figure. Not much surplus fuel is finding its way to the open market.

Bessemer steel billets recently have been offered in this district at $46, mill, and that figure appears to represent the top of the market, although some makers are nominally quoting $50, mill.

Put in Blast

Birmingham, Ala., Aug. 14.—After having been idle for a number of years the old Woodstock furnace at Anniston, Ala., was put in blast the past week on foundry iron. The daily production will be from 285 to 300 tons per day and Crocker Bros. will act as sales agents for the product. J. B. Carrington, of Anniston, Ala., is president of the operating company.

Shapes Sold for Export

Large Tonnage to Foreign Buyers—Pennsylvania Railroad and Norfolk & Western Among Domestic Buyers

Philadelphia, Aug. 14. — A western Pennsylvania maker with principal offices in this city has made a sale of 15,000 tons of plain bessemer shapes for export to be delivered over the next five to six months. The large Russian Car shops inquiry from Canada still is open. The Pennsylvania railroad has placed 2,000 to 3,000 tons of shapes for first half delivery of next year for Altoona with eastern Pennsylvania mills. The price was both 2.50c, Pittsburgh, and at the mill, the delivery figure being about the same in all cases. This road wants 500 tons additional for earlier delivery. The Norfolk Western railroad also closed for about 1,000 tons of shapes for next year with eastern mills. Specifications have been better, though they are not active. Some of the larger fabricators now are more deposed to place forward contracts while they still may do with eastern mills at 2.50c, Pittsburgh, or 2.659c, Philadelphia. Smaller buyers now are being quoted 2.60c, Pittsburgh. It is interesting to note that some of the fabricating shops which in recent weeks have been selling plain material from store are less active along this line and are inclined to conserve their reduced stocks.

Shape Demand Continues

Chicago, Aug. 15.—Although projects involving large tonnages of structural shapes are not being handled, fabricators find a steady demand for their output in smaller quantities. The largest contract placed in the west during the past week involves 720 tons, taken by the American Bridge Co., for two factories for the Amalgamated Sugar Co. in Idaho. Extensions at the Gary works of the Illinois Steel Co. continue to give fabricators added business, and the American Bridge Co. has just taken 400 tons for an extension to the boiler shop at that plant. The National Malleable Castings Co. has placed 231 tons with the Morave Construction Co. for a shipping building at its Grant works. Other recent contracts are for small lots.

Structural Shapes Quiet

Pittsburgh, Aug. 15.—The market for structural material is comparatively quiet, but this is not surprising, in view of the fact that prevailing prices are so high that not many structural projects are being undertaken. Shapes are being held at 2.60c and some tonnage has been sold at that figure; the 2.50c price, however, has not disappeared. The American Bridge Co. has taken 5,500 tons for a former house at Cincinnati.

New White Building

Cleveland, Aug. 15.—Very few contracts are pending in the Cleveland district. The recent advance in price of plain material evidently is having some effect in checking new construction. The Crowell-Lundoff-Little Co. has been awarded the general contract for a saw-tooth construction building which will be erected immediately for the White Co. About 455 tons of roof beams will be used.

July's Poor Showing

New York, Aug. 15.—A drop to the lowest total of awards since February, 1915, was shown by the structural lettings of the country during the month of July, which aggregated only 47½ per cent of capacity; or, approximately, 83,600 tons. This compares with 58 per cent or 100,000 tons in June; 80 per cent or 137,000 tons in May; 72½ per cent or 125,000 tons in April; 102 per cent or 175,000 tons in March; 75 per cent or 129,000 tons in February; and 69 per cent or 119,000 tons in January. The past month's figures clearly show the extent to which structural activities have been curtailed by the increased costs now prevailing.

The monthly statistics of the Bridge Builders' and Structural Society, showing the percentage of capacity contracted for and the approximate tonnage reported, are as follows:

Month.	Per cent.	Approx. tonnage.
July, 1916	47½	83,600
June	58	100,000
May	80	137,000
April	72½	125,000
March	102	175,500
February	75	129,000
January	69	119,000
December, 1915	121	208,000
November	105	180,000
October	78	135,000
September	67	115,000
August	85	146,000
July	86	148,000
June	80	138,000
May	61	105,000
April	62½	107,500
March	64	110,000
February	30	51,000
January	25	43,000
December, 1914	35	60,000
November	20	35,000
October	35	60,000
September	38½	65,000
August	27½	48,000
July	68	115,000
June	56½	95,000
May	57	97,000
April	88	151,000
March	76	130,000

Considerable activity in new structural undertakings in this territory appears to have been stimulated by the recent advance in prices, and by the evidences of heavier buying in other quarters of the trade. An increased number of apartment houses are being brought forward for bids and some loft buildings, for the first time in a number of weeks now are beginning to appear. Builders seem more willing to place contracts despite the high prices. Lettings of the week were better and several propositions are on the verge of closing. The 2.50c, Pittsburgh, or 2.669c, New York, prices on shapes are still being quoted by some mills. Makers export inquiry from J. P. Morgan & Co. for 8,500 tons of plain shapes have been much interested in a recent monthly, for a term of months, and one large order just closed with a western Pennsylvania mill is reported to be a portion of this business.

(*For complete prices see page 346.*)

CONTRACTS AWARDED.

Amalgamated Sugar Co., sugar factories, one at Rupert, Idaho, and one at Shelley, Idaho, 720 tons, to American Bridge Co.

Illinois Steel Co., extension to boiler shop for Gary Works, Gary, Ind., 400 tons, to American Bridge Co.

National Malleable Castings Co., shipping building, Grant works, Chicago, 231 tons, to Morava Construction Co.

Chicago, Milwaukee & St. Paul Ry. Co., two 108-foot pony truss spans, 210 tons, to Fort Pitt Bridge Works.

Central Elevator Corporation, Buffalo, new 2,500,000-bushel grain elevator, taking 1,200 tons reinforcing bars and 1,200 tons structural; general contract to Monarch Engineering Co., Buffalo; to sublet bids soon on the steel.

Crowell-Lundoff-Little Co., general contractor, 455 tons roof beams to G. H. Brooks Co., for White Co., Cleveland O.

The Union Gas & Electric Co., Cincinnati, 5,700 tons to American Bridge Co.

The Russel Wheel & Foundry Co., Detroit, 300 tons of material for Vernor building, Detroit. Part of this award will go to Bethlehem Steel Co.

Building for Pure Oil Co., Carroll street, Brooklyn, 350 tons, to the Hinkel Iron Works.

Bridges for the Boston & Maine, 150 tons to the Boston Bridge Works.

Addition to Hotel McAlpin, Thirty-third street, New York City, 1,200 to 1,500 tons, general contract awarded to the Thompson-Starrett Construction Co.

Brown apartment, Ninety-first and Broadway, New York City, 1,000 tons, to the Passaic Structural Steel Co.

Warehouse for the City of New York, Blackwell's Island, 1,200 tons general contract to Snare & Triest.

Addition to the Abraham & Strauss Store, Brooklyn, 150 tons, to Hay Foundry & Iron Works.

CONTRACTS PENDING.

St. John's Academy, Benwood, L. I., 150 tons, bids being taken.

Additional bridge work for the Pennsylvania Railroad, 800 tons, bids being taken.

Building for the Barber Asphalt Paving Co., Maurer, N. J., 400 tons, bids being taken.

Power plant Pittston, Pa., for Pennsylvania railroad, 400 tons, bids being taken.

Loft buildings for Holland Holding Co. one on West Thirty-sixth street and the other at

West Forty-fifth street, New York City, 600 tons each, bids being taken.

Garbage disposal plant, Staten Island, 1,000 tons, preliminary bids being taken.

Locomotive shop for Boston & Maine railroad, E. Deerfield, Mass., 325 tons, bids being taken.

Customs house, Toronto, 1,500 tons, bids being taken.

Additions to the plant of the E. G. Budd Mfg. Co., Philadelphia, 600 tons, bids being taken.

Addition to the plant of the Carpenter Steel Co., Reading, Pa., 250 to 300 tons, bids being taken.

Loft building for the Jutison Construction Co., West Thirty-fifth street, New York City, 900 tons, bids being taken.

Scrap Stagnant

In the Pittsburgh District — Shows Little Life in Other Centers

Pittsburgh, Aug. 15.—The market for iron and steel scrap in the Greater Pittsburgh district continues to border on stagnation. Scarcely any new tonnage is being sold and many melters are not taking tonnages purchased some time ago. Considerable stock is being rejected. Heavy melting steel continues to be held at $16.50 and above by most dealers, but the $16 figure has not disappeared. Machine shop turnings and borings, which have been weak and irregular for several weeks, have declined to $7.50 a ton.

Listless Market

Philadelphia, Aug. 14.—A better demand for No. 1 railroad wrought for which the mills are offering $20, delivered, is the only point of improvement in a continuing dull and listless market in old material in this territory. The situation continues spotty and is marked by the absence of any sizeable buying by consumers. The market's chief activity is the shipment of old orders and railroad embargoes at Coatesville are a deterrent to this. There were small sales of heavy melting steel in the week at $15, delivered eastern Pennsylvania, which represents the current market. Turnings again are lower, owing to the very liberal offerings of this grade. Recent sales of low phosphorus scrap have been made at $23, eastern Pennsylvania mill.

Market Steady

Chicago, Aug. 15.—Scrap market observers continue to find indications of better conditions during the fall, but at present trading is at a low ebb, and about the only tonnage moving is on previous sales. While this condition continues to exist, dealers and brokers apparently are satisfied to let the condition stand, and are not pushing their holdings as was the case some time ago.

Railroad scrap is offered in somewhat less volume, and the only list now current in this market offers 3,500 tons from the Southern Pacific railroad.

Strong Undertone

Cleveland, Aug. 14.—With local mills not interested in buying and with hindrances to shipments existing at a large number of outlets for scrap, the reason for the present dullness is readily determined. Prices are being maintained with a strong undertone reflected from the better feeling in the pig iron market and from higher prices in finished steel. New sales, however, are comparatively rare and of small tonnage.

The greater use of borings by blast furnace users in western Pennsylvania districts has stiffened the price of this grade of scrap somewhat above that holding in the past two weeks. Sales have been made at a basis of $6 a net ton, Cleveland. Machine shop turnings are weak at $5.75 a net ton, Cleveland, although report of a local mill taking 1,000 tons at $6.50 to $6.75 a gross ton has come to light. Busheling and puddling mills are still out of the market for scrap.

Advances Expected

Buffalo, Aug. 15.—Dealers of the Buffalo district report that heavy melting steel is in good demand, particularly for shipment into the Pittsburgh and the valley districts. In view of the movement that has developed in pig iron and the recent advance in finished steel prices, the dealers are not disposed to make sales of large tonnages of any of the lines of scrap at present schedules. They say they are convinced that many indications point to the early development of a brisk demand in most of the lines and that this situation is sure to result in an advance in prices. So far, however, the scrap schedules have not been changed from the figures previously reported.

Prices Uncertain

Cincinnati, Aug. 15.—Dealers in iron and steel scrap state that they are at a loss to determine exact prices on certain grades, because no sales are being made. Rolling mills in this district are withholding shipments, and foundries are buying only in small and scattered lots. This condition is attributed to the fact that consumers in this district overbought during the buying movement that prevailed about two months ago.

Higher Prices Expected

St. Louis, Aug. 14.—The scrap market has been inactive all week, and although prices quoted have been well-maintained, there has been little, if any, buying by the larger consumers. Brokers are firmly of the opinion that as soon as the hot spell is over, consumers will enter the market for good sized tonnages, and there is a general opinion that higher prices will prevail.

The only railroad offerings on the market are: Chicago & Alton, 400 tons; Southern Railway Co., 3,500 tons.

Can't Break Away

New York, Aug. 15.—Except for some miscellaneous buying of specialties, the iron and steel scrap market has been unable to break away from the dullness which recently has surrounded it. Steel axles have grown very scarce and high prices are being offered for them both for domestic and export shipment. For export $35, New York, now is obtainable, and one buyer is offering $32, delivered eastern Pennsylvania, for home use. There is a little better demand for wrought pipe at $13 to $13.50, delivered eastern Pennsylvania. Eastern dealers have been advised of the placing of a freight embargo against the Carnegie Steel Co. at Munhall, Pa.

Price Concessions

Birmingham, Ala., Aug. 14.—There have been some contracts made for heavy melting steel scrap slightly under prices that have prevailed for this old material in the recent past. Prices ranged from $9.50 to $10 per gross ton, Birmingham. Prices on other old material remain more or less stable, with comparatively little trading in same.

(*For complete prices see page* 346.)

Wire Advance

Has Been Established and Specifications are Heavy

Pittsburgh, Aug. 15.—Manufacturers had no difficulty establishing advanced prices of wire products, announced Aug. 5. Fairly heavy tonnages of nails have been sold on the basis of $2.60 a keg and plain wire is commanding $2.55 per 100 pounds. The advance in quotations tended to stimulate activity; specifications against contracts last week were very heavy and indications are that new buying on a rather large scale soon will be enjoyed.

Cement coated nails and cut nails, despite contrary reports, have not been advanced in price. The former product is held at $2.50 and the latter at $2.60 a keg.

Russia continues to be a prominent buyer of barbed wire, having recently distributed orders for about 25,000 tons for shipment the remainder of the year.

The Hamilton furnace of the Hanging Rock Iron Co., Hanging Rock, O., has been blown out temporarily for re-lining. It will probably be put back in blast about Oct. 1.

Billets Scarce

And Steel Makers Fail to Cover Their Own Shortages

Philadelphia, Aug. 15.—Semi-finished steel for the year's delivery has become very scarce and two eastern Pennsylvania steelmakers who have been canvassing the market to take up shortages in their own supply have been unsuccessful in obtaining material. One of these companies has been seeking 2,000 to 3,000 tons of slabs; the other a tonnage of ingots. Requirements of munition manufacture continue to call for heavy quantities and the problem of the buyers is to get the mills to supply them especially for delivery by Jan. 1. On one lot of 6,000 to 7,000 tons of 9⅜ and 9½-inch billets, inquired for by a munition works in this city, one of the larger eastern Pennsylvania makers quoted for delivery during the third quarter of 1917. Another negotiation by an eastern Pennsylvania munition plant calls for 8,000 tons and another for 25,000 tons spread over five months at the rate of 5,000 tons monthly. A locomotive builder placed 3,000 tons of 6½-inch billets. There has been a fair amount of selling to regular domestic buyers not engaged on war contracts and for export. One eastern maker this week sold 3,500 tons, including 1,000 tons for export. Some of these orders are for delivery after Jan. 1 and for that period the prices obtain approximated the highest now ruling for this year. The market continues to gain in price strength. Leading eastern Pennsylvania makers now hold open hearth rolling billets at $47.50 to $50, Philadelphia, and forging billets at $65, Philadelphia, or mill. Well over $50, Pittsburgh, has been realized on special rolling billets.

Stronger at Pittsburgh

Pittsburgh, Aug. 15.—Continued heavy demand for semi-finished steel products has enabled sellers to put up prices several dollars a ton. Sheet bars have been sold at $46, mill, and some makers are refusing to shade $50, mill. Tremendous tonnages of billets and ingots are wanted for the manufacture of shell steel. A munition maker in eastern Pennsylvania has opened negotiations for 20,000 tons of shell steel ingots, and the Morgan interests are reported to have asked steel foundries to quote on all the ingots they can offer for shipment the remainder of this year and the first six months of 1917. This material is wanted for 8-inch, 9.2-inch and 12-inch shells. Ingots are being held at a range from $80 to $85. It is believed that entente nations will continue to buy material for large shells in this country for an indefinite period.

John Lysaght, of the John Lysaght Co., Ltd., Manchester, Eng., is in this country in an effort to buy sheet bars, and it is understood that he has offered to pay $47, New York, which is equivalent to $45.25, Pittsburgh. One lot of 6,000 tons of bessemer sheet bars recently commanded $46, Pittsburgh, for export.

Problem of Deliveries

Youngstown, O., Aug. 15.—Manufacturers of semi-finished material in the Mahoning valley are unable to book additional business except in cases where regular consumers must be accommodated. The question of price seems to have almost disappeared, the big problem now confronting purchasers being that of securing deliveries. Business is being turned down by the mills to such an extent that customers are beginning to feel some anxiety as to the possibility of filling their requirements. Some of the mills are having difficulty in making deliveries of steel ordered some time ago.

Sheet bars and billets are being sold at prices from $45 to $47 or $48, and most of the mills are quoting $50, which is generally taken as an indication that no steel is to be had at any price. One man who is well acquainted with the semi-finished market confidently expects that the purchase of sheet bars and billets will soon be placed on a premium basis. This belief, however, is not held by many of the steel men in this district, although they admit that the situation is acute.

Several mills have not yet resumed normal operations following the period of hot weather on account of a shortage of water. This has seriously affected the output of one plant, and has been the source of much trouble in several other mills in the valley.

Ray McLaughlin is now secretary to General Supt. I. Lamont Hughes, of the Canadian Steel Corporation, Ltd., Ojibway, Ont. He was formerly employed in a similar capacity by Mr. Hughes at Youngstown. Sydney S. Mowat, who has been in the service of the Steel Corporation's New York office for the past nine years and lately in President Ferrell's office, is private secretary to Ward B. Perley, vice president and general manager of the Canadian Steel Corporation.

Enlarging Foundry.—The Link-Belt Co., Chicago, is enlarging its malleable foundry at Indianapolis. The foundry extension will be a one-story building, 70 x 275 feet, with a wing 106 x 140 feet.

(*For complete prices see page* 346.)

Coke Market

Shows Strength, Although the Demand is Not Active

Pittsburgh, Aug. 15.—The Connellsville coke market, although quiet, reflects strength. Blast furnace fuel for spot delivery has been sold at $2.85 a ton at the ovens and prices below $2.75, ovens, have disappeared. Many cokemakers have banked ovens in order to fill contracts for coal, demand for which has been rather heavy. The market for contract furnace and foundry coke is quiet. Prices of foundry fuel show no change in position.

The Youngstown Sheet & Tube Co. is getting ready to put into operation its new by-product coke oven plant. The completion of the by-product plant at Youngstown and that of Corrigan, McKinney & Co., at Cleveland, may upset, temporarily, the market for spot beehive oven coke.

The Connellsville Courier for the week ending Aug. 5 says production was 394,200 tons, compared with 417,055 tons the week before.

Some High Prices

Birmingham, Ala., Aug. 14.—Some sales of Alabama coke were made during the week as high as $5 per ton at the ovens, covering emergency orders. Coke is still a rare article, and a supply out of the regular routine is more or less a sacrifice and accommodation on the part of producers. Ordinary prices are $3 to $3.25 per ton for furnace or smelter coke and $4.25 to $4.50 per ton for foundry coke.

Quiet at Cincinnati

Cincinnati, Aug. 15.—The coke market is stationary, in regard to brands from the Wise county, Pocahontas, and New River districts. Even the slight demand for prompt furnace coke that afforded the only life in the market about a month ago, has disappeared. Foundries are not out for coke for either spot or contract shipment. Wise county and Pocahontas furnace grades are quoted from $2.85 to $3.25, ovens. New river furnace coke is given from $3.25 to $3.50, ovens, all for contract delivery.

Dull at St. Louis

St. Louis, Aug. 14.—Coke is dull, and few orders are being placed. Connellsville and Virginia foundry grades are held at $3.25 to $3.50.

The production department of the Sanford Riley Stoker Co., Worcester, Mass., has been removed from the plant of the Norton Grinding Co., to Hyde Park, Boston.

Buying of Shell Steel

Is Still an Important Factor of the Market—Some Companies Have Irrevocable and Unchangeable Contracts

New York, Aug. 15.—Another active week in shell steel buying in this territory has been terminated and in that period it is safe to say that several hundred thousand tons additional have been placed under contract with the mills for delivery over the first half of 1917. The movement by no means is over, as some of the mills which have specialized in the production of large rounds and billets for munition purposes have taken only limited tonnages to date and still are negotiating for large blocks. Much of the buying of the past week has been done direct with the mills by official purchasing representatives of the allied powers, in this city. It is mere conjecture to say what tonnage this has aggregated, but enough is known to show that it has been very heavy. One of the Buffalo mills is understood to have received a large order for semi-finished. Independent mills in the Youngstown district are credited with having booked some independent lots. The Steel Corporation made some further sales, but it is learned these have not been large since the leading maker is unable to spare much additional tonnage for many months in the future. Large eastern Pennsylvania producers have taken liberal additions to previous business. French munition works which buy direct still have unclosed a considerable part of their requirements for the first half of 1917.

In addition to the direct export buying, further numerous contracts have been placed with the steel works by domestic munition manufacturers to cover recent orders for finished shells and forgings. A Brooklyn plant divided 20,000 tons among several producers. The 75,000 for requirement for the American Locomotive Co. now has been satisfied and it is understood this went to the Steel Corporation and three independents, the latter including an eastern works which obtained about 10,000 tons. The 26,000-ton inquiry of the Baldwin Locomotive Works is regarded as having been closed with affiliated interests. A car builder bought about 50,000 tons to cover a contract for large forgings. Another sale for the year was 7,500 tons. A number of shell steel inquiries still are pending. In eastern Pennsylvania, one company asks 6,000 to 7,000 tons of 9⅜ and 9½-inch billets, another 4,500 tons of 6⅜ rounds and a third 8,000 tons of billets. An inquiry for 2,500 tons of 4¾-inch rounds for this year for a Cleveland buyer is pending.

Lucrative prices are being obtained by the steel makers for the finished or semi-finished stock, depending upon the size of the rounds and billets and the specification. Some large orders for rounds were closed at 3.75c, mill. For 9.2-inch forgings, it is understood around $25 each has been paid and for 9.2-inch finished shells from $50 to $55 each. Other sizes have varied proportionately.

Many of the contracts for shell steel closed by the mills, especially those for direct export are non-cancellable and contain the substitution clause whereby if the material is not taken out in the form originally ordered, the tonnage must be completed by a proportionate amount of plates, shapes and bars for non-war purposes. It is declared, however, that some of the largest sellers have not been incorporating this substitution provision in their contracts, but have made these instruments irrevocable so that the tonnage must be accepted in the form originally ordered.

Car Buying

Promises to Be More Active, But Orders Develop Very Slowly

New York, Aug. 15.—More inquiries for cars are in the market than has been true for some weeks and those sought run from 5,000 to 10,000. Leading railroad systems undoubtedly are more interested in purchases of this kind, but most of them seem unable to bring themselves to the placing of orders, because of the high prices that are being quoted. It is the opinion of builders they will be unable to hold back much longer on some moderate purchases, as the difficulties of getting steel from the mills to cover orders are increasing. The New York Central has placed 2,000 box cars equally divided between the American Car & Foundry Co. and the Haskell & Barker Car Co. The Lehigh Valley is reported to have withdrawn its inquiry for 1,500 box car bodies. The Delaware & Hudson is asking for 1,000 repairs as well as 1,000 hoppers, which have been out for several weeks. The Pere Marquette wants 650 repairs. The Chesapeake & Ohio has placed 250 repairs with the Western Steel Car & Foundry Co., and the Crystal Coal & Lake Co. 60 mine cars with the Pressed Steel Car Co.

There has been a rumor in the market that 10,000 cars of the large Russian order have been closed with a leading American builder. This company, however, has made no official confirmation.

A new inquiry for 50,000 tons of rails for Russia is in the market. There is also an export lot of 1,800 tons. The Evansville & Indianapolis road wants 1,500 tons.

The New York Central has placed 10 additional locomotives with the American Locomotive Co. for the Michigan Central and Big Four leaving a large number still pending. This same builder has taken three locomotives for the Mogyama railway of Brazil, two for the Braden Copper Co. in Chile and one for the Bingham & Garfield.

Railroads Place Car Orders

Chicago, Aug. 15.—A renewal of car buying is taking place, and railroads are placing orders after a considerable period of quiet. Apparently they have come to the conclusion that prices will not be lower for a long period, and that necessary equipment might as well be bought at present levels, although the cost now has been deemed prohibitive.

The New York Central railroad is inquiring for 1,000 more box cars, and a number of other inquiries made within the past few weeks are being negotiated.

Rail Inquiries Come Out

Chicago, Aug. 15. — Although most American railroads have placed orders for their rail requirements during 1917, a constant demand is being made by rail makers for added tonnage which it is difficult for them to take under present conditions. Inquiries involving from 1,000 to 5,000 tons of standard rails, originating with important railroads, have been received recently, and most have been declined through inability to furnish them within the time demanded.

Some buisness continues to be done in spikes, bolts, tie plates and angle bars, but the capacity of most mills on these products is being rapidly absorbed.

Rails and Track Equipment

Pittsburgh, Aug. 15.—Leading manufacturers of standard steel rails in this district have enough actual orders on their books to maintain present rates of operation until the latter part of next year. For this reason, mill managers are not endeavoring to book additional tonnages. Demand for light rails is heavy.

(*For complete prices see page 346.*)

Pig Iron Output

Shows Larger Increase in Canada This Year—Other Statistics

A special statistical bulletin of the American Iron and Steel Institute gives the figures for the production of pig iron, steel ingots, castings and all kinds of finished rolled iron and steel in Canada during 1915. Some data are also given covering the production of pig iron in Canada in the first half of 1916. The general production figures for 1915 are as follows: Pig iron, 825,420 tons; steel ingots and castings, 912,755 tons; rails, 209,752 tons; structural shapes and wire rods, 114,829 tons; plates, sheets, nail plate, merchant bars, tie plate bars, etc., 328,737 tons. The total tonnage of finished rolled forms is 653,318. The institute estimates that the total production of iron and steel cut and wire nails in Canada in 1915 amounted to 1,636,000 kegs of 100 pounds as compared with an estimated production in 1914 of 1,144,000 kegs, an increase of 492,000 kegs. The production of cast iron pipe and fittings is estimated to have decreased from 93,200 net tons in 1914 to 53,700 net tons in 1915.

The pig iron production for the first half of 1916 amounted to 507,750 tons compared with 458,595 tons for the last half of 1915 and 366,825 tons produced during the first half of the same year. The production of pig iron by grades during the first half of 1916 is as follows: Basic, 388,387 tons; bessemer, 12,575 tons; foundry, ferro-silicon, etc., 95,602 tons; and all other grades, 11,186.

Making Satisfactory Progress

In the state of Minnesota, the survey being made by the naval consulting board of the United States is making gratifying progress. After eliminating a number of concerns that proved upon investigation too small or transient for consideration, the board found that the state had about 1,100 to 1,150 concerns entitled to a place upon its list. So far the board has received about 800 completed inventories from the entire state and found that another 125 upon closer investigation were not important enough to report upon, making 925 and leaving from 200 to 225 yet to be obtained. Of the total number listed under foundry and machinery, sheet and tin metal, brass and bronze, electroplating, fire apparatus, etc., the board has secured reports from 126, leaving 58 which have not yet been reported upon, or a total of 184 in the state. One company reporting employes over 2,000 men, another over 700 and the Minnesota Steel Co.'s plant near Duluth will give employment to a large number. About 80 per cent of the work of the board is completed.

Production of Spelter in the United States

A preliminary government report regarding the spelter situation in the United States during the first half of the year gives the following information which may be revised to an extent not exceeding 1 per cent in the final report which will be issued shortly: Stocks on hand, Jan. 1, 14,253 tons; production from domestic ores, 267,449 tons; production from foreign ores, 48,756 tons; imports, 464 tons; total, 330,922 tons. The figures for the spelter withdrawn from the country are: Foreign exports, 20,197 tons; domestic exports, 58,007 tons; stocks June 30, 24,000 tons; total, 102,204 tons. The apparent consumption as computed from these figures is 228,700 tons. On June 30, there were 193,696 retorts in the United States with 22,188 more either building or contemplated.

Mr. Jennings Retires

Robert E. Jennings, in accordance with a decision to retire from all industrial activities, has resigned as president of the Carpenter Steel Co., Reading, Pa. For many years, Mr. Jennings was well known in the steel industry as the founder and active head of the Spaulding & Jennings Co., Jersey City, N. J. Upon the purchase of that concern by the Crucible Steel Co. of America, Mr. Jennings became for a time a vice president of that company. Since his connection with the Carpenter Steel Co., 12 years ago, the production of alloy steels in this country has had a phenomenal development, with which Mr. Jennings was closely identified. Mr. Jennings will remain a director of the Carpenter Steel Co. With his retirement as president, the company announces the election of the following officers: President, W. B. Kunhardt; vice president and general sales manager, F. A. Bigelow; vice president and metallurgist, J. H. Parker; treasurer, J. S. Pendleton; secretary, W. D. O'Gorman.

The stack of the Wellston Steel & Iron Co., Wellston, O., has been blown in on bessemer iron, and will make 175 to 200 tons per day of this grade.

Form of Contract

Provides for Change of Materials at Conclusion of War

Considerable strength has been given to the steel market recently by a change in the form of contract with foreign governments for steel rounds to be made into munitions. Formerly this class of business was regarded as hazardous in view of the fact that war might end before the contract was completed and result in the cancellation of tonnage.

The new contract is said to provide that in case of the cessation of hostilities before the end of the contract, the buyer shall have the right to change his specifications and take out the remaining tonnage on the contract in the form of shapes, plates, bars, rails or other material needed in rehabilitation.

Inasmuch as considerable buying of steel for munitions is taking place, this form of contract is giving the steel market considerable strength as the sales are irrevocable and the actual tonnage sold will be delivered in one form or another, whereas under former contracts it was not certain that the material would be shipped.

It is understood that this form of contract came into existence within the last 10 days, and is a concession on the part of foreign governments buying in this market to make certain they could obtain material. That it has had a strengthening effect upon the market is evident from the fact that an advance of $2 per ton on most products followed almost immediately after its appearance.

Future of Foreign Trade

If American manufacturers take advantage of foreign trade opportunities, they will not suffer any by the declaration of peace in Europe, according to E. C. Porter, secretary of the American-Russian Chamber of Commerce, of New York City, and H. F. Griffith, assistant manager of the Westinghouse Electric Export Co., who spoke before the foreign trade conference held in Thaw Hall, University of Pittsburgh, last week. Although Mr. Porter admitted that our export trade has been developed under artificial conditions, he said it could be maintained after the war, if our manufacturers seek undeveloped territories and assist in financing foreign enterprises. Furthermore, he declared that military preparedness is imperative if the United States is to go into the market of the world with a definite foreign policy for trade extension.

Ralph D. Williams: Editor, Art Critic, Historian

RALPH D. WILLIAMS, editor of *The Marine Review* for 15 years, died at his summer cottage in Rumsey park, near Cleveland, Monday, Aug. 14. Mr. Williams had been in poor health for several years and when, about 10 days ago he was prostrated by typhoid-pneumonia, his weakened constitution was unable to resist the disease.

Mr. Williams was born near Nottingham, Eng., in 1868 and came to Cleveland when about 10 years old. He attended the public schools, but his schooling was ended early, for at about the age many boys start to college, he became a reporter on *The Cleveland Plain Dealer*, in the service of which paper he remained until 1900, working his way up from reporter to city editor, managing editor and Washington correspondent. In 1900, he resigned from *The Plain Dealer* and returned to Cleveland, becoming editor of *The Marine Review*, which position he held until June 1, 1915, when he retired on account of ill health. After that date, he was not actively engaged, but devoted limited time to statistical work for the Lake Carriers' Association. Mr. Williams was never married. He made his home at 6901 Carnegie avenue with his mother, who survives him. In his long newspaper career, which was characterized by a vast amount of high grade work, two features were most prominent: his devotion to art and his advocacy of the plan of grouping all of Cleveland's great public buildings. Perhaps the latter was the result of his love of art. Be that as it may, it was a great conception. Frank J. Pool, of the Cleveland Museum of Art, said Monday evening: "I always considered Ralph Williams the originator of Cleveland's group plan. Well do I remember how, years ago, he and Frederic C. Howe, now United States commissioner of immigration, talked about the group plan at a little club to which we three and others belonged. They had the original plans drawn and submitted to the chamber of commerce."

In the days when Ralph Williams was city hall reporter, a number of artists had their studios in the hall and their work appealed more strongly to him than did the petty politics of the day. Hence he became the art critic of *The Plain Dealer* and he was a good one. He could and did appreciate real art and never wearied in telling about it. A number of artists who later attained fame of no small degree received their first public encouragement from Ralph Williams, who recognized their ablity before the world knew of it. Closely related to his love of art was his devotion to fine books and he was an enthusiastic member of the Rowfant Club, a book-lovers' organization. The love of the beautiful wherever found did not interfere with success in the thoroughly practical duties of an editor of a marine paper and during his 15 years of editorship of *The Marine Review* Mr. Williams became recognized as an authority on all matters relating to the Great Lakes. "He was thoroughly saturated with facts about the lakes", said J. H. Sheadle, vice president of the Cleveland - Cliffs Iron Co., when he heard of his death. "He was an unfailing source of information. I feel that his loss is irreparable." But this trained newspaper man, this lover of the beautiful, believed that facts could be and should be, whenever possible, dressed in attractive words and the best exemplification of this belief is found in the book from his pen which was published in 1907, "The Honorable Peter White, a biographical sketch of the Lake Superior iron country." Mr. Williams did a prodigious amount

RALPH D. WILLIAMS

of work in compiling the data for this book. It is full of facts, but there is not a dry page in it. It is a romance, a fascinating story of the marvelous development of the great ore deposits. It is a real contribution to the life of the Superior region, more valuable than countless tons of ore, for though ore will be smelted and disappear, this book will live an enduring monument to its author.

Ralph Williams had a wide acquaintance along the lakes fut few *knew* him. Possibly no one knew him thoroughly. Certainly he was much misunderstood. But a few friends appreciated his splendid qualities of mind and heart. To them his life will be a sweet remembrance while in that wider circle of men who love the lakes there will be many who will know the man who, more than any other author, has helped to make their story known to the world.

Henry J. Spieker, one of the best known general contractors in Toledo, O., died recently, a victim of excessive heat. Mr. Spieker was born in Hamburg, Germany, in 1857, was educated in the public schools of Germany, and came to this country in 1880, a homeless immigrant boy with scarcely a penny in his pocket and in a few years established a business which at the time of his death was one of the foremost in the city. The H. J. Spieker Co. has erected many of the finest buildings in Toledo.

Pig Iron Production for First Half

The bulletin just issued by the American Iron and Steel Institute shows that the production of coke pig iron in the United States for the first half of 1916 amounted to 19,347,935 tons, compared with 17,473,500 tons in the second half of 1915. Including the production of charcoal pig iron, which amounted to 191,996 tons, and anthracite and mixed anthracite and coke pig iron, which amounted to 79,591 the total production of all kinds of pig iron for the first half of 1916 amounted to 19,610,522 tons. This pig iron as to grades consisted of 8,830,085 tons of basic, 6,839,177 tons of bessemer and low phosphorus, 3,086,410 tons of foundry grades, 460,839 tons of malleable, 169,306 tons of forge, 189,046 tons spiegeleisen and ferro-manganese and 44,659 tons of other grades.

More than 500 hands have been thrown out of employment by the shutting down of the Phillips Insulated Wire Works, Pawtucket, R. I., for an indefinite period. Numerous strikes have been called at the plant during the past few months, and only last week about 20 operatives in the rolling department walked out because the management refused to grant an increase in pay.

New Electric Steel Foundry

A new electric steel foundry is under construction at Hartford, Conn., for the Connecticut Electric Steel Co., Inc., recently organized. The plant will consist of two steel-frame buildings, one 66 x 120 feet and the other 60 x 80 feet. A 2-ton heroult electric furnace will be installed for the production of high grade basic steel castings and ingots. The plant will be equipped with the usual foundry appliances for the turning out of specialty and jobbing work. Operations are expected to be inaugurated about Oct. 1. Edwin L. Willson, 50 Church street, New York City, is president of the company.

One More Plant

Milwaukee, Wis., Aug. 14. — The Chain Belt Co. was struck Tuesday, Aug. 8, making the twenty-first plant in the Milwaukee district to be affected by the machinists' strike declared July 18 in an attempt to force an organized demand for an 8-hour day without reduction in pay from the present weekly working schedule of 52½ hours.

J. P. Nelson, for several years connected with the Youngstown Sheet & Tube Co., Youngstown, who recently accepted a position with the Jones & Laughlin Steel Co., Pittsburgh, as superintendent of the new skelp mills of that concern, has returned to Youngstown.

The Carnegie Steel Co., at its Waverly warehouse, outside Newark, N. J., is erecting a 1-story emergency hospital.

The Non-Ferrous Metals

Copper **Lead** **Spelter** **Tin**

New York, Aug. 15.—The metal markets during the week closing today have undergone a general reversal of form, and practically all the metals now are characterized by an exceedingly strong sentiment and an upward trend in prices. The strongest of the metals is copper, for which there is a brisk demand both from foreign and domestic consumers. In addition, there are inquiries from foreign governments involving between 125,000 and 175,000 tons, for delivery over the third quarter of 1916, and as called for through 1917. It was reported today that 125,000 tons of this business had been placed, but this is denied by several of the producers. Electrolytic now is quoted as follows: Prompt and August, 27c to 27.25c, cash; September, 26.75c to 27c, cash; October, November and December, 26c to 26.25c, cash. Lake copper is quoted as follows: Prompt and August, 26.25c to 26.75c, cash; September and October, 26c to 26.50c, cash; November and December, 25.50c to 26c, cash. Ordinary casting copper is quoted at 24.50c to 24.75c, cash, for prompt and 24.37½c to 24.62½c, cash, for August and September shipment. Prime casting copper made from virgin material has sold at 25c, delivered 30 days, for September and October shipment.

A large amount of business was transacted in the spelter market last week at comparatively low prices. Much of this came from galvanizers and a still larger tonnage from abroad. There also was some eager buying by second hands and brass mill closed for a few tonnages. Prices have been headed sharply upwards the last few days, although the volume of business now is not so large; at the same time, interest is sustained. Prime western now is quoted as follows: Prompt 9c to 9.25c, St. Louis; August, 8.87½c to 9.12½c; September, 8.62½c to 8.87½c; last quarter, 8.37½c to 8.62½c. Brass special spelter is quoted at 9.75c to 10c, St. Louis, for prompt shipment.

The tin market has been featured by an upward movement in prices, reported to be based on the probability that licenses for exporting the metal from England to this country might not be so readily obtainable the next few months. It is borne in mind, however, that such rumors, although frequently heard since the war broke out, have not yet materialized. Today's prices were slightly off. Spot is quoted at 39c to 39.12½c, August at 39c, September at 38.87½c, October at 38.75c, November at 38.62½c and December at 38.50c.

Demand for lead has been rather slow, although prices have firmed up, due partly to the better sentiment underlying the metals generally, and partly to the expectation that much lead business will result from shrapnel orders placed or being placed. The outside market now is quoted at about 5.85c, St. Louis, and 6c to 6.05c, New York. The American Smelting & Refining Co. still is quoting 6c, New York, and 5.92½c, St. Louis.

Demand for antimony for the first time in several months is active. This morning fully 300 tons, comprising mainly nearby futures, were closed, and new inquiries this afternoon involve more than 600 tons, also principally futures. Business has been done lately at less than 9c, duty paid, for spot, but the market now is firm at about 10.50c to 11.50c, duty paid.

The aluminum market has been quiet but fairly firm, due to the fact that there is not enough of the metal offered to depress the market. No. 1 virgin ingots for prompt shipment in carload lots are quoted at 58c to 59c; No. 1 remelted is quoted at 56c to 57c, and No. 12 alloy at 46c to 47c.

(*For complete prices see page* 346.)

The Utilization of Various Slags

PERHAPS the most gratifying feature of the industrial development of the United States during the last decade is the gradual appreciation of the economic valve of the by-product—The author of this article outlines some of the uses to which iron and steel works' slag has been adapted and proved satisfactory

BY E. C. BROWN

THIS paper deals with the material commonly known as slag, sometimes cinder. Although this material embraces a number of substances differing more or less in form, color and composition, several of which will be touched upon later, the principal one which will be given consideration is the waste residue from the modern blast furnace in which iron is produced. Our definition, therefore, while general, will apply particularly to the slag produced in the modern blast furnace. This slag is the residue from the ore, the fluxing material, generally limestone in one or more of its forms, and the ash of the fuel, coke being the form most commonly used. This substance includes substantially all the non-volatile constituents in the materials mentioned, remaining after the metallic iron has been separated from the earthy matter in which it occurs as ore. Briefly, and somewhat more scientifically, it may be defined as the molten substance, other than the metal under treatment, (*a*) in smelting operations, of the gangue of ore combined with the fluxing material; (*b*) in purifying processes, of substances introduced for the purpose of effecting or assisting purification. It contains all the non-volatile constituents in the ore, flux and fuel, which do not appear in the metal.

Slags of the iron and steel industry are of two general classes, that resulting from the production of iron; and that resulting from the refinement of iron, or the production of steel. The former may be further divided into slag from the production of bessemer or acid iron from the so-called bessemer ores, that from the so-called basic or non-bessemer ores, and a small quantity from the production of ferro-manganese and spiegeleisen. These blast furnace slags are all much alike in appearance and general character. The second, or slag from the steelmaking operations, may be divided into converter or cupola slag from the refinement known as the bessemer process, and the slag from the open-hearth furnace in which basic iron is converted into the commercial open-hearth steel.

As noted above, those which will be chiefly considered in this paper are the slags from the blast furnace operations, and betwen the two processes, the bessemer and basic, there are only slight differences in the resulting slag, either chemical or physical; and this slag, for we will generally consider them as one and the same material is that for which practical uses have most largely been found.

Early Methods of Disposal

Without going into the forms and methods of disposition of slags from the early types of blast furnace, but rather beginning with the modern furnace, substantially as it is known today, we find that the earlier forms of disposition of the slags were principally as waste material, valuable only as filling for low lying ground. In those early days the slag which issued in molten form from the slag notch of the furnace was led through and into trenches or runners formed in the sand or loam in or near the cast house and alongside the furnace, where it was allowed to cool. The addition of a spray of water hastened the cooling which, however, requires only a few minutes. When sufficiently cooled the long strips, so to speak, of slags were broken up with sledges by laborers, then the larger pieces were loaded by hand, and the smaller by forks, into cars or other conveyances, in which they were hauled away and deposited on the dump or, as in many cases, turned over in railroad cars to the railroad companies for such use and disposition as they had for it. This method is still in use at some furnaces.

Where the furnace company had low lying ground not too far distant which it wanted to have filled, the molten slag, instead of being run into the runners above described, was run into small box-like receptacles on trucks, or narrow gage cars, to which the common name of modock was applied. The modocks were generally hauled in small train lots to the dumping ground where disposition was first made by removing a plug and allowing the molten slag to discharge, and later by tilting devices whereby the discharge was facilitated. Probably the earliest employment of power in the preparation of slag for disposal, was by the use of the drop for breaking larger masses of cooled slag which had been formed in shallow pits or depressions under a crane or derrick.

As the value of broken slag in its denser forms was recognized and some uses made thereof, a form of rendering it, known as machine or pancake slag, was devised. The machine which followed the development of the well-known pig casting machine is simply an endless chain conveyor fitted with shallow pans about 20 x 45 inches by 2 inches deep, the lips of which come substantially in contact as they travel. The length of the conveyor, about 150 feet, is sufficient when the rate of travel is approximately 70 feet per minute, to allow the slag to cool and set. Water is sprinkled on the slag just before reaching the dumping point at the end of the run, for further cooling and cracking the thin sheets of slag, and the drop into the car breaks them into small pieces, ranging in size up to about 1½ inches. If the machine is run at a speed much greater than that mentioned water must be used earlier and in larger amounts in order to cool the slag sufficiently for direct loading into the car. This results in the granulation of part of the slag and the impairment of its commercial value. When properly made this form of slag is a very satisfactory concrete aggregate. As a practical disposition method the machine is not economical. Both installation and maintenance costs are high, and the capacity is limited. A machine, adequate to the demands of the large modern furnace, requires rather extensive ground area, especially as to length, if a good quality of product is to be maintained.

However, with the changed conditions brought about by the erection of the large modern furnaces, and especially where these occurred in groups, other methods of disposition became necessary. The hot slag ladle, a development of the earlier modock,

The author, who is chief civil engineer, Carnegie Steel Co., presented this paper at a meeting of the Engineers' Society of Western Pennsylvania.

is used at many furnace plants. It is essentially a big cast iron pot, at first carried by a yoke supported on railroad car trucks, but now a more stable cast iron or steel skeleton car body is employed to support the ladle and its accessories. The transportable pot or ladle thus formed has the necessary tilting mechanism which is operated by hand, steam or compressed air. The modern ladles have a capacity of about 200 to 260 cubic feet. The cost of this type of equipment is heavy, both in original outlay and maintenance. The molten slag is run directly from the furnace by the cinder trough into these ladles and hauled to a convenient dump, sometimes as far as 8 or 10 miles.

Method of Granulation

The ladles are placed on track on the edge of the dump and unloaded by tilting. With the modern air-dumped ladle this operation is quite expeditious. It requires only about two minutes per ladle or from 15 to 20 minutes to discharge the contents of a train of seven or eight cars. Usually the skull or hardened shell of slag slips from the ladle with, or immediately following, the liquid slag. Occasionally the skull tends to adhere to the iron pot, particularly if the latter has been cracked or is otherwise defective. It is usually easily forced out, however, by a few dashes of water thrown from a bucket and aimed at the point of contact between skull and pot. Manifestly, the higher the dump the more economical is this manner of disposition. From such slags or from those deposited, the greater proportion of the principal commercial slags is produced. It is generally left to cool and weather for several months and is then excavated by steam shovel and crushed and screened to various sizes for use as ballast, concrete aggregate, road metal, roofing slag and filter material.

The granulation of slag destroys its dense condition and produces a light and more or less fine granular substance, resembling coarse sand in appearance. In this form the slag will weigh, perhaps, from one-fifth to one-third as much, volume for volume, as when it is cooled naturally in mass.

There are two methods, essentially alike, however, by which this granulation is accomplished; the second method being rather an improvement of the first or simpler one. This simpler method is that, used at many blast furnaces, where the molten slag is run directly into a tank, or brick or concrete pit, partly filled with water, in which the disintegration of the slag is accomplished by simple contact with the water. This product contains many light, fluffy particles in addition to those of finer and denser character, and much of it is as coarse as popped corn, which, when the color is light enough, it rather resembles. Owing to its great porosity much of it floats until it becomes cold and saturated with water. Only the denser particles settle at once to the bottom of the tank.

The second method, sometimes called gun granulation, may be briefly described as follows: The molten slag is delivered from the furnace through the ordinary trough or runner to a concrete pit, at the edge of which the trough takes the form of a large nozzle, fitted with an annular ring, from which issue water in the form of spray delivered through 4-inch pipe under pressure of from 30 to 40 pounds per square inch. This causes disintegration and partial cooling of the slag, which operations are further accomplished by the water which partly fills the pit, and by the force of the impact with which the slag is thus driven against the opposite wall of the pit. This product is considerably more dense than that of the method described above, and has been used to some extent as a substitute for sand in concrete work. A modification of this method is the introduction of a jet of air or steam under high pressure and the use of little or no water, and by further modifying the apparatus a substance, very much like commercial mineral wool, has also been produced experimentally.

In all these granulation methods the slag is excavated from the receptacle, generally a concrete pit, by means of grab bucket and crane, and loaded in a saturated condition into standard railroad cars, in which it is transported to the dumps or other places for final disposition. Much of the water rapidly drains out through the bottom of the car.

Dry Granulation

Because of the use of granulated slag in brick making and in the manufacture of cement, where moisture in the slag is economically objectionable, there has been perfected a so-called dry granulation process, which has been used, to some extent in Germany and elsewhere in Europe. The essential feature of this process is a rotating cylinder into which the slag stream is directed with a blast of air and a small amount of steam under high pressure. These, together with an arrangement of baffles in the cylinder break up, granulate and cool the slag, making a dense product containing a very low percentage of moisture and has given satisfactory results. A method recently patented employs loose chains or bars held in place at one end, which are laid across large shallow pits into which the molten slag flows, surrounding and covering the chains. After the slag has cooled and becomes solid the loose ends of the chains are lifted by crane and pulled through the mass of slag breaking it up into such size and condition as to enable its being sent at once to a crusher and manufactured into commercial form.

Slag Analysis

In spite of considerable variation in both the chemical and physical properties of blast furnace slag, there is a fair degree of uniformity in this material. The differences which exist are due partly to variations in chemical composition, but probably are due equally to physical causes or methods of operation and treatment. Generally speaking, calcium and magnesia together form approximately one-half while silica and alumina make up most of the remainder of our slag. Typical analysis of blast furnace slags from lake ores under hot blast practice, is as follows:

Silica	35.22
Alumina	13.68
Calcium	43.00
Magnesia	5.74
Iron Oxide	0.49
Sulphur	1.61

There are, of course, due to variations of the flux and ores, rather extreme variations in analysis, but generally we are not interested in them in considering the slag problem from the point of view of utilization. In this connection it may be wise to refer to the question which has been raised by some engineers and others as to the effect of sulphur or other elements, such as magnesia, in slag which might prove injurious to reinforcing metals placed in slag concrete, or which would produce injury through chemical action, as by expansion. We may say that practically all of our blast furnace slags are decidedly basic in character, there being present almost always some excess of free lime, and the small amounts of sulphur occur as sulphides only, and are, therefore, harmless to metal. As a practical matter, there are numerous instances on record where anchor bolts and other forms of iron or steel, embedded, for reinforcing or other purposes, in slag concrete, have been removed after several years and found to be in perfect condition, no corroding or other injurious influences having affected them, thus disproving any theory of this nature. Blast furnace slag has already found

its way into an extensive field of industrial usefulness, principally of course, as construction material. A complete list of these uses would be quite extensive, and I will enumerate only a few of the more important ones. Granulated slag is used extensively as a material in cement manufacture, as a cushion under brick and block pavements, as filter material in certain chemical recovery processes, as fine aggregate in concrete, and as a base or filler for commercial fertilizer. The chief uses for hard slag, crushed and screened to size, are for railroad ballast, for road macadam and paving foundations, as concrete aggregate, as filter material, especially in sewage disposal works, as roofing material, and in fireproof construction. The 965,000 tons of slag and miscellaneous material sold last year were distributed for use about as follows:

	Tons.
Cement	375,000
Railroad ballast	250,000
Road work	195,000
Concrete	85,000
Other uses	60,000

Perhaps the most extensive use of commercial hard slag today is in road improvement work, where it has given most satisfactory results. This is so whether in plain water-bound macadam, or in combination with tars, asphalts or other special binders. The best concrete road I saw, on a recent extensive trip of inspection, was laid with slag concrete. Several of these roads have been in service from two to five years and are wearing well.

Physical Properties

As an aggregate in concrete for all general purposes slag has been thoroughly tested and is far beyond the experimental stages. It has gone into all kinds of buildings, walls, bridge work, light reinforced structures such as fence posts and telegraph poles, floors, roof slabs and in fact into practically everything for which concrete of any kind is suitable. In not a few classes of construction it is especially well adapted because of its relative lightness, good bonding qualities and perfect fire resisting nature.

Average commercial blast furnace slag has a specific gravity of about 2:62; limestone averages 2:60; granite, 2:68; and trap rock, 2:96. Slag is of a grayish color, breaks with decided angularity, is somewhat porous, and weighs commercially approximately 2,000 pounds per cubic yard. Of these qualities, perhaps the most important, or at least the most conspicuous, is its porosity, which may be more properly characterized as cellular construction. This accounts for its relative light weight. At this point perhaps we may as well refer to the weight of some of the forms of blast furnace slag we have been considering: Crushed and sized bank slag, as ordinarily produced and shipped, weighs 1,900 to 2,100 pounds per cubic yard; granulated slag varies greatly, probably from as low as 800 or 900 pounds to as high as 1,500 to 1,600 pounds, the average being about 1,300 pounds—both fineness and moisture greatly affecting the weight.

Relative Weights

It might be interesting to note some of the relations by weight between the slags we have been considering. Under the average operating conditions in the western Pennsylvania and Ohio district, the weight of slag from the blast furnace is about one-half of that of the metal produced. This is, however, subject to considerable variation. It may, under certain furnace burdens, be nearly as low as 40 per cent, or again, as high as 60 per cent, although that resulting from the production of ferro-manganese may even considerably exceed 100 per cent. Therefore, given the tonnage of iron produced at a plant or in a district, we have at once practically learned the amount of blast furnace slag.

The amount of slag to the ton of metal in the steelmaking or iron-refining processes is much less, and also much more variable than that from the blast furnace. I think it averages rather less than 10 per cent by weight. To roughly complete our quantitative analysis, we might add that all the other waste and refuse material would perhaps amount to about 20 per cent. From this we may say that from a fairly complete modern plant in this district producing 1,000,000 tons of iron, which it converts into steel, and then rolls into finished or semi-finished products, there is turned out about 800,000 tons of slag and refuse waste material. The metal and this waste are all the solid or non-volatile matter left of the 3,500,000 tons of raw materials, ore, coke and limestone, used in the original smelting operation.

But little commercial or industrial use has thus far been made of either the open hearth or converter slags as compared with the better known and more abundant blast furnace slag. But something along conservation lines in this by-product has also been accomplished. As stated a little while ago, the amount is probably not more than one-fifth as great as of blast furnace slag, and not infrequently considerable quantities are again used by being returned to the blast furnace, either as flux when high in lime, or because of other chemical elements which they contain and which are desired in adjusting the chemistry of the blast furnace charge. Both the converter and open hearth slags are handled in much the same way as that from the blast furnace, by runners, pits and ladles, while at one converter plant, of which I know, it is granulated and when passed through a revolving drum, flushed with water to separate it from the metallic iron or steel, thence passed out with the water into car or pile for removal or use. This slag product has been successfully used in concrete work. It is well graded from fine sand-like material up to particles an inch or more in size.

Open hearth slag has been ground and used in agriculture with success as a soil corrective, giving higher and quicker results than lime applied in other and more usual forms. I understand that at Birmingham, Ala., the slags from the high phosphorus local ores are being built up by recharging till they contain as high as 12 or 18 per cent phosphorus, thereby being put into the same class of fertilizers as the imported Thomas meal or phosphate slag. (This plant was described fully in *The Iron Trade Review*, July 6.)

Slag Concrete Tests and Practice

Before concluding I wish to refer again to the use of slag in concrete. The Carnegie Steel Co. organized, some 10 or 12 years ago, a department, or bureau, for the commercialization of blast furnace slag and other refuse materials from its operations, including ashes and the slag from the steelmaking processes. Considerable progress has been made in the years since that time, and it has disposed commercially of millions of tons of this waste or by-product for various purposes. Prior to the year 1908, occasional uses of slag had been made in concrete work, notably machine slag in fireproofing, but during that year a series of somewhat elaborate experiments were started which involved the manufacture of about 800 concrete specimens in the form of 12 and 16-inch cylinders. These experiments were made for comparative purposes and included specimens of stone and gravel, as well as slag concrete. The tests indicated generally that slag concrete was fully equal to either of the others, and in many instances it proved superior to them.

Of all the uses thus far found for blast furnace slag, there is none, in my opinion, to which it is so well adapted as in concrete. In its texture and physical properties, even in its substance itself, it is almost, if not quite, the ideal material.

The Sales Engineer and His Relation

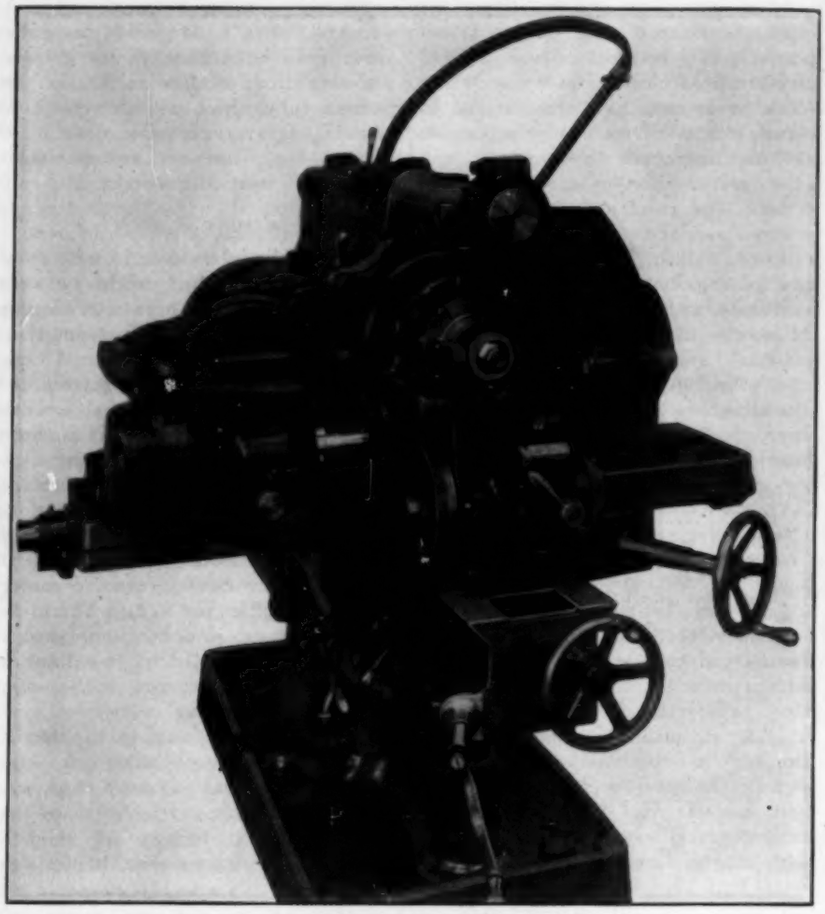
The Story of the Passing of the Demonstrator and the Rise of His Successor, the Sales Engineer —His Influence on the Trend of Machine Design

BY A. J. BAKER

THE title engineer has already been subjected to so many prefixes that one hesitates to add another to the already confusing number. There seems, however, hardly any other term than that of sales engineer which quite so well defines the activities of that growing class of engineers with whose influence on design and production it is proposed to deal in this paper.

It is, of course, no new thing for the larger engineering institutions, notably, electrical, hydraulic, railroad, etc., to bring their engineers directly into, and to keep them in touch with the problems that they have to solve. This is accomplished through personal visits to the locality of the proposed installation and investigations of the natural conditions that have to be overcome. It is even obvious that no thoroughly satisfactory results could be expected unless such research were made, and in the industries mentioned, such action is considered entirely standard and customary. It is not the writer's intention to touch on such fields of activity, but rather to confine his observations to the application of the same principle to the machine tool industry.

As one views the progress of machine tool design, one cannot help but feel that it has been largely left to the user of a machine to indicate the changes which made the machine more particularly suitable for his class of work, and that the designer and maker of the machine has generally been the second party in such improvements. I do not refer to detailed improvements particularly in regard to the construction of the machine, but rather to those marked departures from type, that may be said to mark the advances in the art. In other words, it would appear that the majority of the engineer-designers of most machine tool factories have for many years been working on improvements of well defined types of machines and cannot have made that rigid investigation of the conditions which govern the use of such machines that would seem to be absolutely essential if ideal conditions are aimed at.



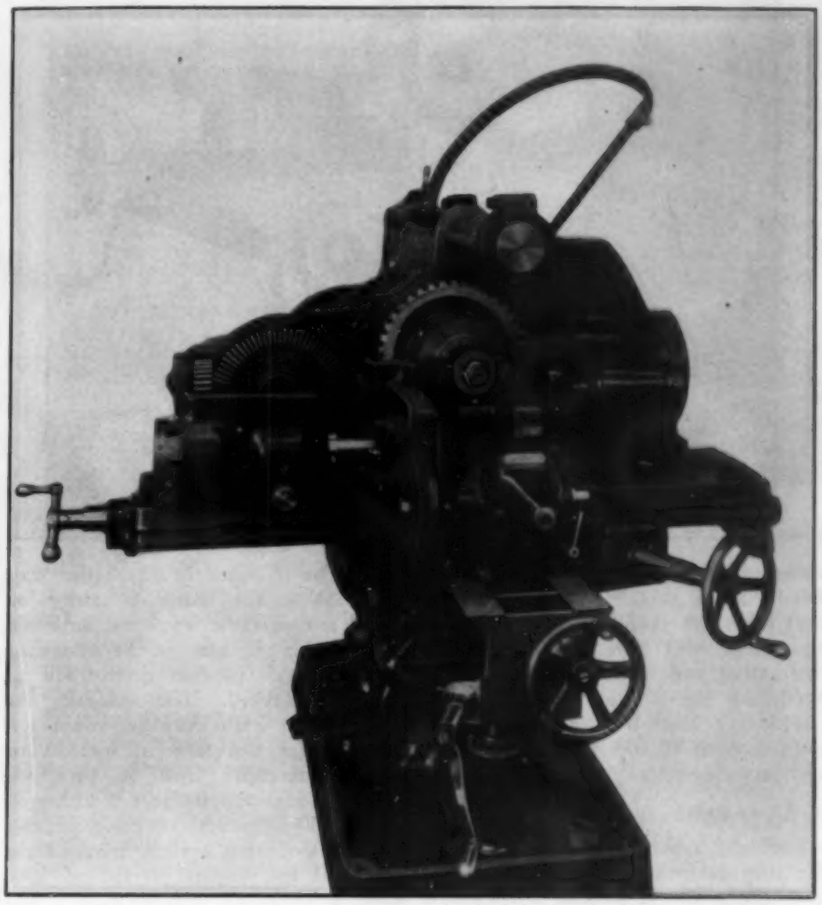
A milling machine with equipment, designed for milling turbine buckets from bar stock. It is necessary to mill a groove in this bar for the steam passage. The groove has a cam section when viewed both along the longitudinal and cross axes. The obvious question that presents itself on seeing this illustration is, "Why the milling machine?" The answer to that question would really be that the sale of the milling machine was an adjunct to the task of furnishing the special equipment necessary, since the latter is more expensive and more complicated than the machine proper.

There are very strong commercial reasons from the manufacturer's standpoint for standardizing the design of machine tools. From the user's viewpoint there is the further excellent reason that relates to the ability of the average operator to handle, with the minimum amount of individual instruction, any machine of the class in which he claims proficency. Probably in the last analysis, this would also be regarded as a commercial reason, but it must also be taken into account in view of the apparent tendency toward the increased employment of unskilled help and the comparative difficulty of obtaining that rare individual commonly known as an all-round machinist.

This tendency to standardize on types of machines is again a very logical outcome of the development of most machine tool factories, which will be found to have grown up from a small organization breaking away from a parent company and devoting its energies to that one particular machine of which the new organization had a very definite knowledge. The growth of the new concern, as a rule, demanded the close attention of all the responsible parties toward solving the immediate problems. The tendency was to limit the activities of the engineers to individual parts of the machines and not to encourage attempts to produce variations of machines suitable to the special require-

Delivered at a recent meeting of the Cincinnati section of the American Society of Mechanical Engineers. The author is connected with the Cincinnati Milling Machine Co., Cincinnati.

To Production and Machine Design



A milling machine with the cover removed to give an idea of the interior mechanism. All of the movements of the work itself are self-contained in the fixture, which has a combination axial and radial cam movement, controled by master cams with compressed air resistance chamber. The table feed, cross feed, etc., are used only for the preliminary adjustments. This equipment points to the need of a special frame to take the place of the milling machine. Such a frame would contain a simple driving mechanism and a solid base, on which the fixture would be mounted.

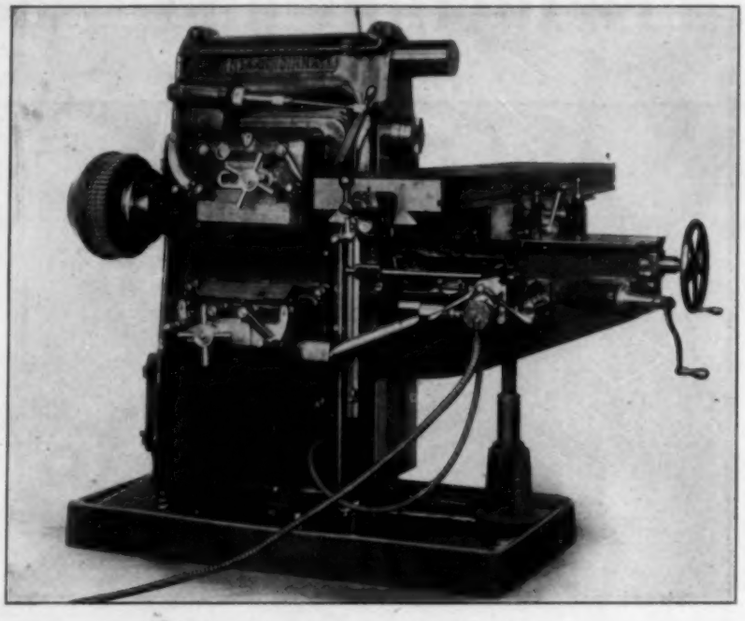
ments of each individual customer. Today we are vitally concerned with a somewhat different problem. The user of a machine tool has been educated to demand of the machine tool manufacturer a specific study of his requirements. These studies have, and will more markedly in the future, influence the design of the manufacturer's product. The service plan, in vogue in many trades, has become a part of machinery organization.

This condition has led to what I term the sales engineer. His predecessor was the original demonstrator, who it will be remembered, was and still is a man unusually skilled in the use of the machine which he demonstrates and who is sent out to break in the workmen and to assist the customer in obtaining high production from the newly installed tool. These demonstrators in their visits to the different plants accumulated considerable experience in regard to the uses and weaknesses of their machines. They provided a highly valuable intermediary between customer and manufacturer and following the natural onward tendency, they were in some cases replaced or augmented by engineers, whose duties were not in any way connected with the demonstration or practical operation of the machine. They observed the uses to which the machine were put. These observing engineers carrying back to the factory their authentic data, were able to materially influence new designs. They were still, however, concerned only with the standard type of machine and were only brought into contact with the customer's requirements after the machine was installed, and usually when some trouble had developed with the installation.

The next step was in the utilization of these engineers in conjunction with salesmen, or agents, to investigate the customer's conditions before recommendation was made as to the installation of machines. You will note that his function was not to sell the machine; in fact, it was his duty to prevent the sale of machines where his knowledge made it evident that the customer's best interests would be so served. It became necessary, therefore, particularly as the mechanical responsibility of the whole transaction developed upon him, to make a reasonably thorough analysis of the problem before proceeding with any recommendations. This analysis, in many cases, leads directly towards the design of new machines of possibly the same general classification, but of an entirely different type and I propose to mention here a few of the causes that bring this about in much greater measure than when the older method of machine design was followed.

The original machine designer usually devoted himself so closely to his own particular machine, that he was not thoroughly in touch with developments taking place on other classes of machines. Even today, in the great majority of cases, that condition prevails. The sales engineer, on the contrary, being brought directly and frequently, in touch with the last installations of such machines, immediately returns to the factory with advance information of the encroachments that the new type of machine is making on his own field. The designing department, lacking a detailed acquaintance with the last usage to which machines are put, loses its proper perspective in regard to the relative time values of the different functions of the machine. The sales engineer, with any reasonably well developed analytical faculty, can clearly see that a certain portion of the operation consumes more time than is really necessary, that the output is governed by this factor, and advises the home engineer of the need for improvement in this respect. The home engineer includes in each new machine or each new design certain parts, which, while necessary, or at least desirable, under the old system of comparatively low production, are not only unnecessary, with the present high production ratio, but are absolutely undesirable on account of the added complication which their

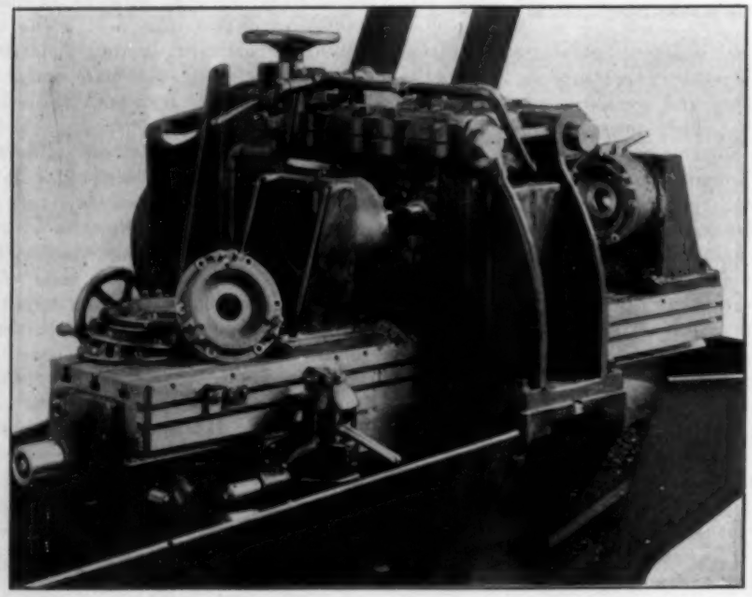
In milling turbines, it is found that cessation of the feed movement when combined with a continued rotation of cutter nearly always results in an indentation or marking of the work. The machine was then equipped with a pneumatic cylinder connected with the starting handle. The cylinder was operated through the usual compressed air system in the factory and controled through a pair of valves on the feed trip rod, so that as soon as the feed plunger was depressed by the trip dog, the feed movement stopped and the spindle stopped also. The momentum in this particular case was sufficient to just disengage those teeth which were cutting at the moment of the feed cessation and so avoid leaving any ridges where the teeth were in contact with the work. The machine was then available for the operator to return the table, either by hand or through use of the feed lever to throw the spindle clutch back and start up both speed and feed mechanisms simultaneously.



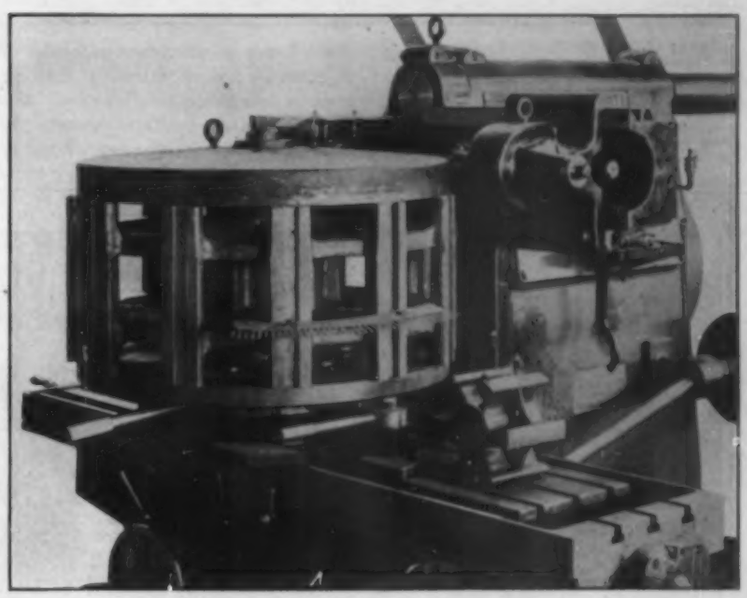
presence entails. The sales engineer, being brought face to face, as he must often be, with the relative selling prices of machine tools, will naturally tend towards an elimination of those less desirable features with a consequent simplification of the machine. His more continuous travels throughout the various shops must of necessity bring him into close contact with many home-made devices, which are often the basis of permanent improvements in standard design. It is idle to suppose for a moment that such improvements are found only in the larger shops, to which as a rule, the visits of the home engineer are confined. More often it will be found that the small shop with its restricted equipment, will have produced some interesting and instructive method of producing the desired results, where the larger and wealthier shop has been content to increase its quota of standard machines.

Comparative Data Are Valuable

Carefully tabulated records of similar jobs performed in different shops will nearly always indicate parts which may be omitted and functions that should be added, which information cannot be obtained in any other way with either the same certainty or speed and in these ways the influence of the sales engineer on the design of his company's product cannot fail to be very marked. His influence on production, while closely connected with design and thus of interest to the manufacturer, will be of more vital and material interest to the customer. The general adoption of this sales engineering system immediately places at the disposal of the machine user, a corps of highly trained engineers whose collective abilities are likely to greatly exceed those over



A triple spindle milling attachment fitted with an adaptation of the semi-automatic miller. Before this equipment was considered, the work was handled in the stereotyped way, which consisted of one chucking, milling one set of bosses, indexing through 120 degrees, milling the next set, indexing, milling the third set and removing. With this equipment, the three spindles mill all of the surfaces at one passage and the work itself is automatically clamped in place by means of the spring plunger shown in the center of the fixture. The table is provided with an automatic quick forward movement, feeding movement, quick return to the fixture on the other side, feeding movement, and so on. The functions of the operator in this case, are also restricted to that of hooking the work on to the central locating stud and the removal of the same. The operations are so timed as to allow the removal of one piece and the insertion of the other while the cut and the quick traverse from the work take place.



An arrangement for milling dovetail grooves in armature spider. The cutters are not carried on the regular milling machine spindle, but on the two-spindle, special radial drill arm, which is fastened cross-wise to the milling machine column. Each of the mills cuts one side of the dovetail and part of the bottom of the groove. By indexing around and taking one indexing more than the number of grooves to be cut, a full set of grooves are secured in a very short time.

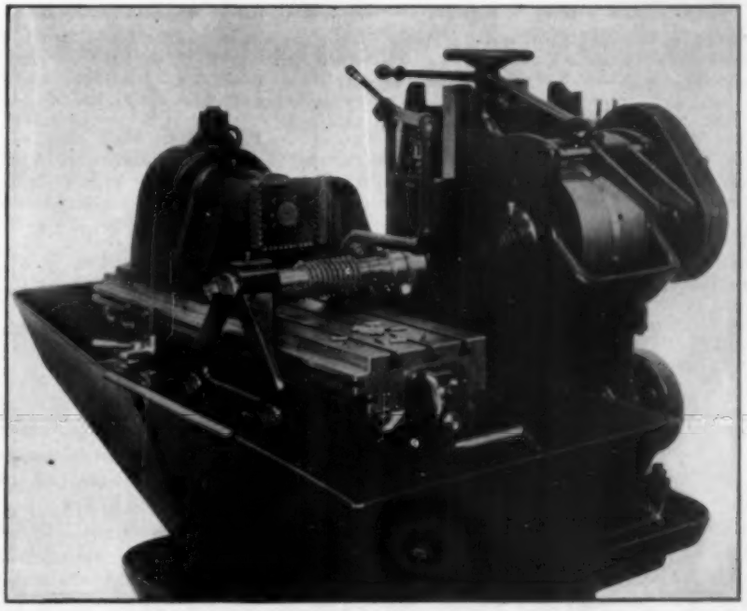
Here again is a distinct departure in two ways from the regular milling machine which in the beginning, it was desired to purchase for this work. The original idea was that the work should be mounted on centers and the table feed of the machine utilized. The cutter would also have been carried in the regular spindle of the machine, but as the vertical feed of the machine was used, the work rested on a face plate and two cutters carried on entirely independent spindles milled the grooves.

which he would normally have control. Their advice and recommendations should, and often do, lead to the scientific selection and installation of machines, which, while representing a lessened installation outlay, will give much greater production than if the older system of machine purchase were followed.

It must be apparent that the recommendations of the sales engineer cannot be made on the spur of the moment, but must receive a reasonably thorough preliminary study and investigation. In one company it has been the practice for the last half dozen years to make comparatively elaborate time studies, for which considerable advance information is needed. This information must not only cover the end which it is desired to accomplish, but should also include a reasonable amount of data as to the earlier and existing methods.

Entering New Fields

This is particularly essential because it has developed that the sales engineer, seeking continual outlet for his machines, will often invade the field that has been considered the exclusive property of some other type of machine. It is sufficiently obvious that there must be much debatable ground to be fought over by the competitive representatives of the engine lathe, the turret lathe and the automatic machine, and again between the planer, shaper and miller. The ideal conclusions drawn from such investigations can only follow a very full consideration of all of the factors connected with production and not alone, as is sometimes the case, with the number of pieces turned out per machine per day. For these reasons certain standard forms are used on which is entered the following in-



An apparatus for milling small tractor binder pins. These pins are slightly taper on the outside. The old method of handling this work was to use a standard milling machine operated by a man engaging the feed, returning the table and removing the work from the fixture. He was aided by a boy, who drove the pieces into the work holder of which two were provided. With the method shown, the production per machine is even greater and only one operator is required. The fixture is arranged so that it indexes automatically and so that the forward movement of the work to the cutter is taken at a high table traverse. The work does not have to be removed from the fixture after the milling operation is completed because the third stop in the indexing brings the finished pieces against a fixed ejector bracket which pushed them out of the holes. The operator loads into the upper horizontal surface and he can also load in the front vertical surface should he fall a little short in his chucking of the full number held in the one side.

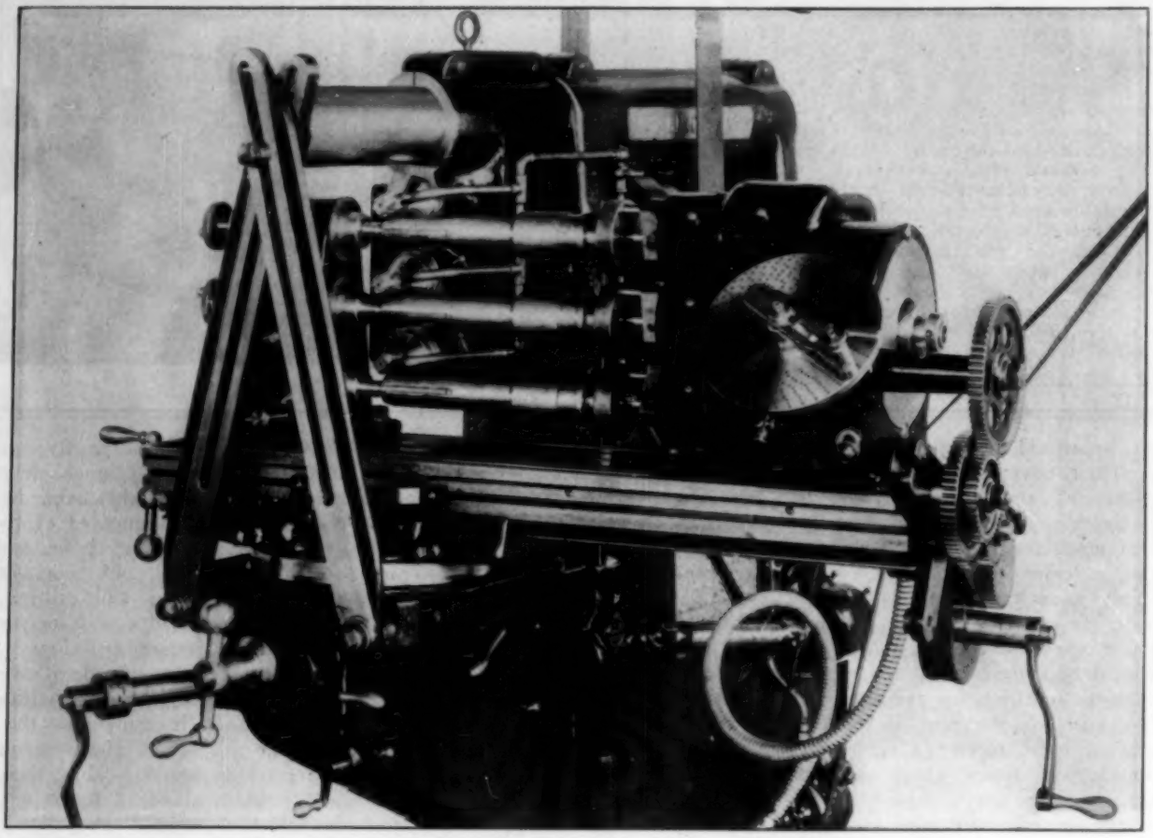
formation, derived from the user of the machine:

1.—The quantity per annum and, if possible, the size of the lots in which the work is put through the factory.
2.—The degree of finish required.
3.—The quality of material.
4.—The depth of cut.
5.—The machine on which the work is now being done.
6.—The time consumed.

by a sketch of the piece, or preferably by the customer's blue prints. Samples for preliminary cutting tests are also obtained whenever possible. With all of this information, a time study can be made up, which will give in full detail the separate operations, the time taken for each part of the operation, the speed and feed necessary and a sketch and description of the fixture and cutters to be used. The resulting total time, which will then represent the time required for the production of the individual piece, receives the addition of a certain percentage, which will vary with the nature of the shop and is a figure that can be easily established as a standard. This information is then submitted to the customer and in certain cases accompanied by a cost sheet, comparing the suggested and existing methods. This sheet will specify the time per piece, including the above percentage; the total time per annum for the quantity of pieces required; the wage cost; and the burden or overhead cost; showing an annual saving over the old established system. This saving may be balanced against

7.—The wage rate paid.
8.—The burden or overhead charge, particularly if departmental burden is available.
9.—And the objections, if any, other than as to the time consumed, that may be made to the existing method. This latter may deal with the labor supply, the dependence upon certain materials, or certain other limiting conditions.

This report is supplemented either



A three-spindle fixture and attachment arranged so that the three cutters are each on their own shanks and may each be provided with an independent adjustment toward the center of the work-carrying member. This eliminates the problem of getting a true running arbor, on which will be mounted three cutters, all of exactly the same diameter and all running perfectly true. By having the three separate slotting cutters integral with shanks, three grooves are milled at once with a degree of accuracy that cannot possibly be secured from a triple cutter on one arbor. It is also possible to feed the work past the cutter at a much higher rate than would be possible with the larger cutters.

This special adaptation was designed specifically for milling the slots in commutators. The old practice was to use a standard knee and column milling machine. It was necessary to adjust the work around on the center, to throw in the table feed and at the end of the stroke to return the table by hand power to the starting point and re-index. The operator stands at the left hand end of the table, gazing past the side of the cutter on to that portion of the commutator into which the slot is to be milled. He can then place both his hands on each side of the commutator and easily bring it into alignment. He brings the commutator into close proximity with the cutter by an initial downward pressure of the foot lever. He can with this foot pressure even bring the work right on to the cutter, so that a preliminary notch is milled in the square corner of the commutator. When satisfied that he has cutter and work in alignment, he forces the foot treadle fully down, which throws in the power feed. The table then moves forward, mills the slot and returns quickly to the starting point. Use is made of a heavy spring returning the table at about five or six times the rate usually employed.

the increased cost of equipment as contemplated by the customer. Such cost comparison and estimate sheets are in themselves not necessarily final, but their great virtue is that they form a nucleus for specific analysis and recommendations, on the part of the customer and his engineers. It is particularly important that such detailed information should be submitted because the production from a given machine is very often entirely independent of the ability of that machine to carry through a certain cut. It is often entirely dependent upon the chucking time afforded the operator and still again, frequently it depends upon the spacing of the feed marks, or quality of finish. This latter may very well be a commercial necessity and entirely independent of the degree of accuracy.

Increasing Chucking Capacity

We can assume that the time study shows conclusively how the major portion of the operation still is dependent upon the operator's chucking capacity. There are two ways in which this may be increased, either by the elimination of certain functions he must perform in connection with the machine, or by so changing and improving the holding arrangements for the work as to reduce the chucking time proper. In a great many cases the former situation is the one that develops, since it is only reasonable to suppose that the fixture or work-holding device, having been made especially for the job, shall represent a higher degree of efficiency than can be found in a machine which has been designed for more general purposes. It is here that the two-fold influence of the sales engineer on both design and production becomes pronounced. It is brought home to him very strongly that the specific limitation of his machine, while originally of small importance, is preventing a greater output. It must then suggest itself to him that some mechanical means must be found for overcoming the hand operation of the machine and either of his own volition, or through the home engineering department, he will produce modifications of the machine to suit requirements.

A further important point in this connection is the influence that would be brought to bear by the customer himself. His viewpoint of the machine must necessarily be different from that of the manufacturer since he is not in the slightest degree concerned with the details of its construction. It is almost impossible for the manufacturer himself to take that view, since on the careful watching of those details must depend much of his success. The user will more often clear his mind of all the details of the machine and reach the pertinent points that are connected with production. He is more apt to compare the machine the sales engineer may be interested in with some other entirely different machine, which incorporates some feature of marked importance to his particular class of work. It would seem, for instance, that the day of the automatic power return of the tables of small milling machines would have come much sooner, had its users compared the miller with the planer in the way that should have been done. It would really not have been necessary to compare the miller with planer, but to have compared it even with some of the larger planer type milling machines, on which such apparatus is standard equipment. It would further seem that the flooded lubrication of milling cutters should have come sooner, had the proper comparisons been made between a milling machine and a grinder, and parallel cases could doubtless be found throughout the full machine tool field. The customer, as a rule, either has not the time, or he perhaps lacks the energy to bring such points strongly enough to the attention of the manufacturer and it is to be hoped that through the efforts of the sales engineer more concerted action between user and maker will accrue.

There is another phase of the sales engineer's influence on production and that is concerned with the work-holding methods or fixtures. There are in many shops ingenious methods in force for achieving a desired end, which methods may be very well adapted, not necessarily to the same specific job, but to others of a similar nature. Now these methods must come fully under the eye of the sales engineer, not only in his visits to the customer's shop, but in his comparison of the suggested with the existing method. This interchange will be more far-reaching in its influence than if the comparison between methods and production were always limited to one type of machine, since, as is well known, the different types of machines have each tended to develop a different system and standards of holding appliances.

Influence of Representatives

The foregoing roughly outlines the direction in which the sales engineer may be expected to influence production and design. More striking evidence of the growth of this particular field of activity is to be found in the changing personnel of agencies. As is well known the great majority of the machine tool concerns of this country are represented by agents who are by virtue of their limited individual territories, brought more closely in contact with the customer than the sales engineer can hope to be. It needs but little reflection to see that the change in the make-up of the machinery salesmen, or agencies has been very marked and that their ability to render practical service to the consumer is much greater than ever before. Some of the agencies with which the writer is acquainted are controled by men of marked mechanical attainments. Their influence on production is very great indeed and in certain cases they have contributed considerably to the creation of new designs. It is probable that the full record of the influence of the separated selling houses on machine tool design would make highly interesting and instructive reading.

Influence of Work on Design

There must result for all of us some distinct benefit from a full and careful interchange of ideas and it seems that this can hardly be made with much more certainty and satisfaction than when the medium is one who must demonstrate the efficiency of that machine in which he is vitally interested, or failing such demonstration, must make changes in the product to meet the conditions found.

The accompanying illustrations show the particular influence that has been exercised on milling machines by such work as has been described. Some of the improvements are to be found in the fixtures themselves, but in certain cases the design of the machine has been entirely changed to give the ideal manufacturing conditions.

The illustraions are not offered as examples of perfected co-ordination between the customer and manufacturer. Some of them are indeed rather intended to show how far we have fallen short of the ideal while still complying with existing commercial conditions. The purpose that they do fulfil, however, is to show that an attempt has been made to depart from standard practice where the need for such action was indicated by a study of the conditions. The resulting equipment, while not ideal from a designer's standpoint in that it was obviously necessary to start with a foundation laid down for more general purposes, does nevertheless perform satisfactorily and so justifies itself from the viewpoint of dollars and cents. More important than this, however, is the clearer light thrown upon the problem, the positive indication of the direction of future design is for even greater co-operation.

Steel Maker Gives Farm to Sharon

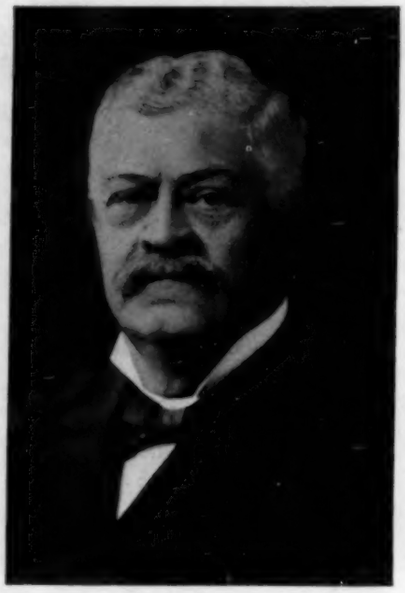
A WONDERFUL 300-acre playground has been given to Sharon children by a prominent steel maker—Frank H. Buhl has spent over one million dollars to provide healthful recreation for Sharon people—Property is deeded to holding committee and is well endowed—The casino and swimming pool are popular

BY C. F. WILLIAMS

A CASUAL visitor seldom sees any boys or girls playing in the streets of Sharon, Pa. One witnesses no miniature reproductions of European battles, no wild-west hold ups, no Indian wars, no juvenile pursuits of Villa, within the borders of the city. Back-lot baseball games have become passe and Sunday picnics along the banks of the Shenango river near Sharon were thrown into the discard many months ago. And yet there are as many imaginative, red-blooded children, as many major league prospects and as many picknickers living in Sharon and its vicinity as one might expect to find in any community of equal area and similar surroundings.

Sharon is unlike most other cities in this respect, principally because of Frank H. Buhl. He has provided a source of recreation and entertainment that has taken the children from the streets. Mr. Buhl has equipped and given the people of the Sharon district a 300-acre farm for a model playground. He has built a modern club house, and has erected a beautiful country club for the men, women and children, principally the children, of his community. Of course, the club, which is located only a few minutes' walk from the center of the city is known as the Buhl club, and the farm is referred to as the Buhl farm.

Frank H. Buhl's munificent gifts, which make Sharon unique in many respects, represent an expenditure of more than a million dollars. However, he never has made a public statement as to how much he has spent to help educate and to provide recreation, entertainment and amusement for the people of the Shenango valley. The donor of these properties successfully has dodged publicity all his life and probably never will be the subject of a full-page story in a Sunday supplement. He knows that all the kiddies living within a radius of 50 miles from Sharon love him, and he wants no further recompense for his generous gifts.



FRANK H. BUHL

Members of the iron and steel trade know him as the man who conducted the affairs of the Sharon Iron Works, founded by his father, Christian H. Buhl. Frank H. Buhl built the Sharon steel works, now a part of the Carnegie Steel Co.; he also built steel works at Farrell, Pa., later acquired by subsidiary companies of the United States Steel Corporation. He is no longer referred to as a steel manufacturer; he is known as the First Citizen of Sharon.

Early last autumn, manufacturing concerns and the people living in the Sharon district took part in a Buhl day celebration, to pay tribute to the man who has done so much for their community. Mr. Buhl, confined to his home by injuries sustained in an automobile accident, could not participate in any of the festivities, but he indicated that the demonstration had more than repaid him for his gifts. The people of Sharon immediately decided to hold a Buhl day celebration every year, to give Mr. Buhl an annual dividend on his investment in behalf of the youngsters and grown-ups of the Shenango valley.

The Buhl farm is located about a mile northeast of Sharon. It contains 300 acres of rolling field and timber land, which has been turned over to the public. Four and one-quarter miles of macadamized roads have been built and more than 40,000 trees and shrubs

COUNTRY CLUB HOUSE

SHALLOW LAKE FOR SMALL CHILDREN

PAVILION AND LAKE

have been set out. A 9-hole golf course, six tennis courts and a base ball field have been completed. A steel grand stand having a seating capacity for 1,000 persons, was erected at one end of the ball grounds.

Not far from the ball park, two artificial lakes are located; the larger covers approximately 11 acres and gives the youngsters of Sharon an ideal substitute for the "old swimmin' hole." The smaller lake, which covers about two acres, is not more than 18 inches deep; it gives the children a safe place to wade and splash. More than 1,100 tons of Lake Erie sand were hauled to Sharon to give the lakes suitable beaches. A casino, near the larger lake, contains dressing and rest rooms, and a large dance hall. Playground equipment, representing an expenditure of several thousand dollars, gives the children other forms of recreation and amusement.

Frank H. Buhl built and furnished a very beautiful club house, which stands on a knoll a short distance from the lakes, for the members of the Sharon Country Club. This structure is not open to the public, but its architecture adds considerably to the beauty of the farm.

Mr. Buhl prefers to have the playground referred to as a farm; it is not a park, he says. There are no "keep-off-the-grass" signs, and only a few rules and regulations. Artificial flower beds are omitted because visitors might be tempted to pick bouquets. There are no police officers on the Buhl farm to tell the children to "cut out the noise" or to "get out of the way."

The Buhl farm is in charge of George Rettig, a well-known landscape architect, who designed Poland Manor in Packard park, Warren, O. He was connected with the park department of Cleveland for 16 years. The first steps in laying-out the farm were taken in 1912, and all the work has been in direct charge of Mr. Buhl. On last January, he deeded the property to a board of trustees and provided an endowment of $500,000, the income from which will be used to meet current expenses. The Buhl Club is located almost in the center of Sharon. It is understood to have cost about $250,000. It contains a library of 14,000 volumes, a gymnasium, bowling alleys, billiard hall and recreation rooms.

LOWER END OF LAKE, SHOWING BRIDGE

DRIVE THROUGH FARM

Measures Deflection of Test Bars

A DESCRIPTION of a simple device designed to measure the deflection of the standard cast iron arbitration bar—The apparatus utilizes the Ames dial by means of a thrust spindle and bell crank in such a way as to accurately measure deflection at the instant of fracture, yet avoiding injury to the dial

BY H. L. MORSE

THE apparatus hereing described was designed to measure the deflection of the standard cast-iron arbitration bar when tested on the 100,000-pound Emery testing machine in the ordnance laboratory at the Watertown arsenal. It was constructed in the arsenal shops and it accomplishes its special end in a simple, accurate and satisfactory way; is cheap to construct, rugged in design, and applicable with but slight modification to any type of testing machine. The problem presented was to measure, at any load or at rupture, the deflection at the center of a practically cylindrical rough casting of a diameter of 1¼ inches supported at both ends, with a free span of 12 inches and stressed transversely by a load applied at the center of its span. Variability of length between supporting points was suggested for the reason that the best length of the arbitration bar might ultimately be determined to be greater than 12 inches, and the suggested alternative lengths, 16 and 18 inches, were therefore to be provided for in the design. The machine to which the apparatus was to be applied is the Emery horizontal hydraulic type, shown in Fig. 1 At the left is the loading cylinder, adapted to be pin-locked to its two supporting rods at various distances from the weighing cylinder for different lengths of specimen, and to which oil from an accumulator, located across the room, is supplied under pressure by the system of piping seen rising at the left from the floor and appearing above as an inverted V.

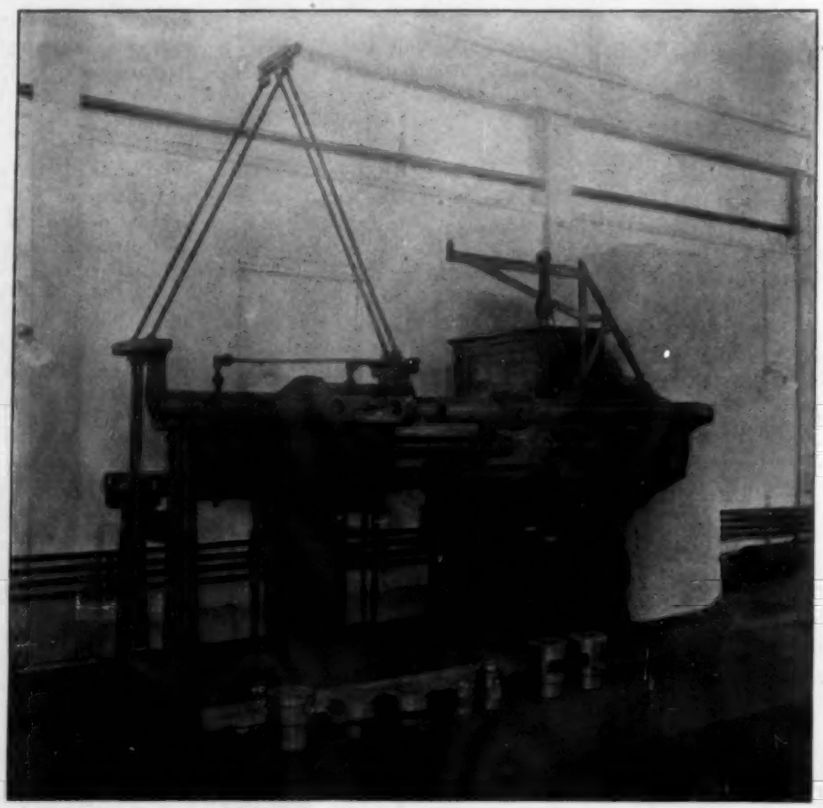


FIG. 1—EMERY 100,000-POUND HORIZONTAL HYDRAULIC TESTING MACHINE

The transverse stressing to destruction of a specimen of the dimensions of the arbitration bar within the standard limits, 20 to 40 seconds, is easily accomplished on this machine by means of a very simple adjustment of the loading control valves regulating inflow and outflow of the oil from the accumulator. As the starting point of design was conditioned by the design of the machine just described, to the two pistons of which the loading and weighing elements of the apparatus must be attached, so the final, as well as the intermediate character of the train of elements of the deflection-measuring device was conditioned by the choice of the Ames dial as the deflection indicator. Other conditions required that no part of the deflectometer should be under appreciable stress; that rupture of the specimen should not occasion inordinate shock on any frail element, especially on the Ames dial; and that there should be quick and accurate zero adjustment, independent of scale adjustment of the dial.

Fig. 2 shows the apparatus in the testing machine, with the arbitration bar in place ready for test. This view is taken from the opposite side of the testing machine to that shown in Fig. 1. Fig. 3 shows the principal parts of the apparatus, and Fig. 4 shows the deflection - measuring device still further separated. Fig. 5, page 328, shows in diagrammatic form the relation and interaction of the principal elements as assembled and operating. The load is applied and the bar is supported by hardened tool steel pins *p* and *qq*. These are ground to easy drive fit in holes bored in the steel casting *a* and *c*, which have hollow hubs threaded to fit the piston rods of the testing machine. These pieces constitute the entire loading and weighing device. The deflectometer *d* is held against the face of the casting *c*, and against and under elements of the supporting pins *qq* by the clips *ff* and stiff clip springs *hh*. The pins *qq* are an easy drive fit in clips *ff*. In the center of the back of the deflectometer plate *e* is fitted a key, which fits with an accurate slide fit in the key-way *k*, thus accurately centering the deflectometer but permitting free relative movement along the direction of the loading force, and hence avoiding any strain of the deflectometer plate.

On the face of the deflectometer plate are screwed two guides *nn* for the

Presented at the annual meeting of the American Society for Testing Materials, Atlantic City, June 27-30, 1916.

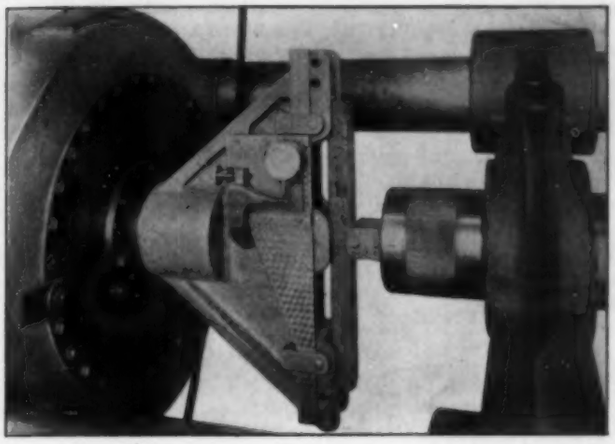


FIG. 2—VIEW OF TESTING MACHINE SHOWING APPARATUS AND ARBITRATION BAR IN PLACE

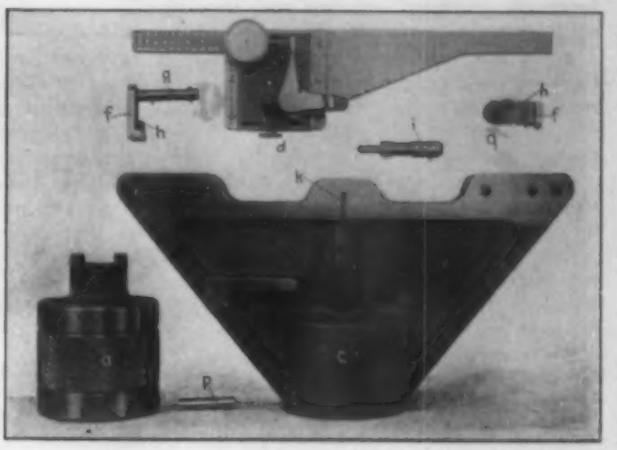


FIG. 3—PRINCIPAL PARTS OF THE APPARATUS. THE LOADING AND WEIGHING HEADS *a* AND *c* ARE CAST STEEL

slide *m*, the inner one of which carries the gib *g* adjustable by two gib screws. The movement of the slide *m* is in a line accurately perpendicular to the edge of the deflectometer plate *e*, which bears against the pins *qq*, and accurately parallel to the principal plane of the casting *c*. The distance parallel to the plate *e*, from the outer guide *n* to the plane perpendicular to plate *e* containing the principal axis of the casting *c*, must be very accurately finished, so that the distance between the spindle *i*, which is located in that axis, and a plane through the pintle axis of the lever *l*, parallel to the motion of the slide, will be the same as the distance between the axis of the spindle of dial *o* and a plane perpendicular to the motion of the slide *m*, containing the pintle axis of the lever *l*. Accuracy in the particulars just noted insures accurate conversion of the deflection movement of the center of the bar through spindle *i* and lever *l* to the spindle of the dial *o*.

The bearing for the pintle of lever *l* is bored in a lug cast on the slide *m*, perpendicular to the under face of that slide and at accurate distances from the dial spindle and the left edge of the plate, for reasons indicated in the preceeding paragraph. The active faces of the ends of this lever are case-hardened and ground to lie in two perpendicular planes through the axis of its pintle. One arm of the lever is bent to recover the offset from the spindle of the dial *o* to the principal plane of the casting *c*, in which the axis of the spindle *i* is located. A stop on the lever and a corresponding stop on the pintle hub prevent counterclockwise motion of the lever beyond the angle at which the plane through the dial end is parallel to the slide guides. A spring *r* imposes a counterclockwise force on the lever, holding it against its stop or against the lower end of the spindle *i*. The spring incorporated in the Ames dial holds its spindle outward against the face of the end of the lever *l*.

The dial *o* has a lug on the back by which it is attached, by a screw *t* shown

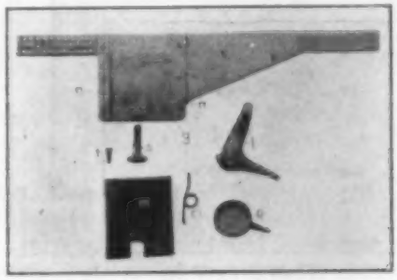


FIG. 4—THE DEFLECTOMETER SEPARATED INTO ITS PRINCIPAL PARTS

in Fig. 4 to a lug cast as an integral part of slide *m*. As previously suggested, this lug must be accurately machined to make the dial spindle exactly perpendicular to the slide guides at an exact distance from the pintle axis of the lever *l*.

The spindle *i* is designed with a wedge-shaped end for bearing against the inner side of the test bar, and a conical point at the other end which bears against the inner end of the lever *l*. The reduced diameter at the conical end produces a shoulder at that end, which strikes a corresponding shoulder in the spindle socket, and limits the movement of the spindle in that direction when the bar breaks. A small pin driven into the spindle near the wedge end moves freely in a slot in the wall of the spindle socket, preventing rotation of the spindle, and keeping the edge of the wedge-shaped end always perpendicular to the axis of the test bar. The spindle is case-hardened all over.

Deflection of the test bar imparts motion to the spindle *i* which is held firmly against it by pressure of the inner face of the lever *l*, due to force of lever-spring *r*. A clockwise motion of the lever results, which moves the outer end away from the dial *o* an amount equal to the deflection of the test bar, the arms of the lever being of equal effective length. The interior spring of the dial *o* keeps its spindle pressed firmly against the face of the lever, the movement of which, equal to the deflection of the test bar, is thus measured and indicated by the dial. The perpendicular relationship between the dial spindle and the spindle *i*, conjoined with the same relationship between the faces of the two arms of the lever, and the fact that the planes of these faces pass through the lever pintle axis, results in equality between the amounts of motion of the two spindles, irrespective of the amount of angular displacement of the lever *l* from its initial position, as a simple diagram will immediately show.

The device was constructed of steel throughout. The loading and weighing heads, *a* and c, and the slide *m* were cast, and the lever *l* hand-forged. The loading and supporting pins are of tool steel, hardened and ground, and the spindle *i* and faces of the lever *l* were case-hardened and ground.

In operation the test bar is held in place by hand until the loading pin grips it firmly with an initial force of 30 pounds, which is about sufficient to crush through the sand layer adhering to the bar and produces no measurable deflection. The dial spindle is once for all adjusted so that when lever *l* is against its counterclockwise stop, some considerable further inward motion of the spindle is possible. The adjustment screw *s* is then turned so that the lever *l* is brought nearly but not quite to the extremity of its counterclockwise movement. The dial proper is now turned by means of the knurled ring which

forms its mounting, so that the zero of the dial comes under the pointer. The operator then starts application of the load, checking the speed by a stop-watch, and the observer watches the dial and catches the deflection very easily at the moment of rupture.

About thirty bars have been tested with entirely satisfactory results, with the possible exception of the behavior of the spring *r*, which it is believed will be replaced by a short spiral spring, acting in tension on the dial arm of the lever and parallel to the dial spindle. A recent test of the accuracy of the deflectometer in place, using an inside micrometer against the wedge end of the spindle *i*, showed an apparent error of 0.0008-inch in a total movement of 0.1-inch. Of this error probably half was due to flexture of the micrometer mounting. As has been noted in the description of the device, the design is such that the deflectometer is not subjected to any appreciable stress due to the stressing of the test bar, so that it is proper to assume that the error just noted is the maximum which will occur in actual use. This degree of accuracy is believed to be entirely sufficient for this character of test.

Manganese Ore Production for 1915

The production of manganese ore in the United States in 1915 was 9,651 long tons, the largest since 1901 and more than three times the production in 1914, which was 2,635 tons. This output was made by 34 operators in 10 states, of which the four most important, in order of output, were Georgia, California, Virginia and Arkansas, according to figures compiled by the United States geological survey. In addition, Alabama, Arizona, Colorado, Tennessee, Texas and Utah produced small amounts of ore. The imports of manganese ore for 1915 were 313,985 tons, which should be compared with 283,294 tons for 1914. Of the ore imported in 1915, 268,786 tons, or 85 per cent of the total, came from Brazil—more than twice the quantity received from Brazil in any preceding year. The imports from India were 36,450 tons, or about one-fourth the average of the preceding 10 years. No ore was received from Russia.

The production of manganiferous iron and silver ores for 1915 was 798,404 tons, which was almost twice the output in 1914. Most of this ore was used in making high-manganese pig iron, but a large quantity was used as a flux by lead smelters; 66,530 tons contained more than 15 per cent manganese and a large part of this was used to make low-grade ferro-manganese.

The quantity of ferro-manganese marketed in 1915 was 144,260 tons and the imports were 55,263 tons. The available supply, or 199,523 tons, was greater than that for 1914 but 15 per cent less than the average for the preceding two years, which covered a period preceding the war in Europe.

The price of ferro-manganese rose to $115 a ton in December, but it is reported that during April, 1916, much higher prices were offered—$175 a ton for future delivery and $400 a ton for immediate delivery. The production of spiegeleisen in 1915 was 114,556 tons, which, with the 200 tons imported, represents an increase of 45 per cent over the available supply for the preceding year. If the increase in the production of steel is considered it becomes apparent that less manganese is now used in the manufacture of steel than formerly, a conclusion that may indicate either that the final product contains less manganese or that ferro-manganese is used more efficiently.

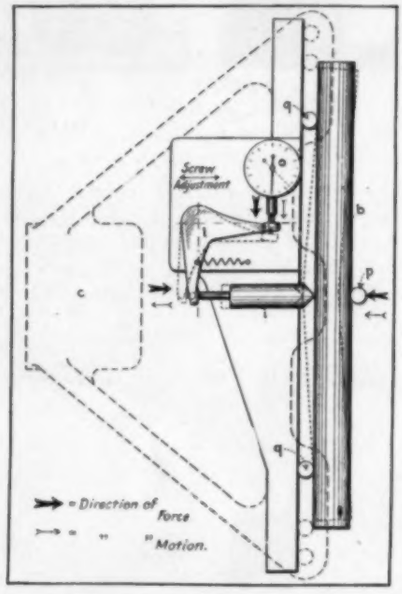


FIG. 5—DIAGRAM OF APPARATUS

The prices offered for manganese ore adapted to the manufacture of ferro-manganese rose during 1915 to the highest figures that have been recorded for 30 years. In August eastern alloy makers offered $22.50 a ton for 50 per cent ore, which should be compared with $12.50 per ton, the average price for the preceding five years. In March, 1916, it was reported that $32.50 per ton was paid for such ore. This great rise in prices was due largely to the advance in ocean freights caused by the shortage of vessels in which to move imported ore. There is good reason for expecting a further increase in domestic production during 1916 as a result of the high prices offered, but it is doubtful whether more than 10 per cent of the domestic demand can be met by domestic production.

The shortage of high grade manganese dioxide ores caused by cessation of exports from Russia has become a serious menace to the dry battery and flint glass industries. Prices as high as $85 a ton are freely offered, but as only a few deposits in the United States can supply ore of this grade little domestic ore has come to the market. There is a record of a marketed production of 550 tons from mines in Arizona, California, Colorado, Utah and Virginia during 1915, whereas the annual demand ranges from 20,000 to 25,000 tons. Ore of this grade was imported from Japan and Cuba during 1915.

Book Review

Industrial Preparedness, by C. E. Knoeppel; cloth; 145 pages; 5 x 7¼ inches; published by *The Engineering Magazine*, and furnished by *The Iron Trade Review* for $1.00 net.

The titanic struggle abroad is entering its third year, yet there are individuals who insist that preparedness is a waste of money. To those illogical radicals, C. E. Knoeppel's *Industrial Preparedness* means little or nothing, but to the hard-thinking, foresighted business man this little volume holds a wealth of vital facts. Germany's military and industrial preparedness forms the keynote of this work and careful analysis of conditions in this country compared with conditions which existed in Germany before and after the declaration of hostilities makes up the theme. Mr. Knoeppel frankly states that his attitude is strictly neutral, but that he is an ardent admirer of German efficiency as it is practically applied in every German institution, governmental or private.

The book is made up largely of quotations from prominent men and well-known periodicals and trade journals. The practical rules which are followed by successful German institutions, the French aptitude in making progress where others have failed shows in striking contrast to the inefficient methods which are too often practiced in the United States. The German system of methodically mapping out a campaign and the detail with which every step of that campaign is adhered to produces the best results. There is a strong plea for organized effort on the part of American manufacturers against that time when a union of such interests must be effected in order to protect the industries of this country.

WHAT'S WHAT and WHY

Don't Ask Yourself-Ask Us!

Questions from our Readers answered by Experts

Detecting Alumina Inclusions

If aluminum is used as a deoxidizer in manufacturing steel, is there any danger from inclusions of alumina weakening the finished product? If so, is it possible to detect alumina inclusions by metallographic examination?

Aluminum, when used as a deoxidizer, has some tendency to appear in the finished steel in the form of alumina inclusions which may weaken the material. A number of scientific investigators have examined this question, including Heyn, Bauer, Sauveur and Comstock. Alumina inclusions may be detected by metallographic examination, although considerable skill and experience are required. Unless the specimen is polished very carefully, small pits are formed around the inclusions, making identification difficult. Alumina inclusions can be distinguished from ordinary silicate inclusions owing to the fact that the latter are elongated in the direction of rolling, and the alumina inclusions are not. Furthermore, silicate inclusions may occur in comparatively large sizes whereas the particles of alumina invariably are small.

Educational Legislation

Has any vocational education legislation been enacted at this session of congress?

The senate recently passed a bill introduced by Senator Hoke Smith, of Georgia, chairman of the committee on education and labor, providing for federal co-operation with the states in promotion of agricultural and industrial education. The postmaster general, the secretaries of interior, agriculture, commerce and labor and the commissioner of education would form a federal board under the measure to supervise the work and to distribute funds. The bill would appropriate $500,000 for 1917, $750,000 for 1918, and annually increase the amount by $250,000 until 1925, after which the annual appropriation would be $3,000,000. The money would be allotted to the states on the basis of rural population. The bill has not yet passed the house.

Foreign Buyers

Can you tell me how to get into communication with J. E. Inckel and J. C. Ankersmit, who are reported to have arrived in New York a few days ago for the purpose of buying large quantities of railroad equipment, agricultural, electrical and other machinery, in the interest of the Dutch government?

Letters may be addressed to Messrs. Inckel and Ankersmit, care of the Netherlands Consulate, 11 Brodway, New York, where they will be held until these gentlemen register with the consul. Later, it is expected, they will open a permanent office in New York.

Armor Plate

What is meant by the Corey reforging process in the manufacture of armor plate? What is the general composition of armor plate made by the St. Chamond process?

The Corey process in its original form is not used in the present type of armor plate. It consisted in forging the plate nearly to size and then carburizing, after which the armor was forged to exact size. These operations were followed by hardening.

The steel used in the manufacture of armor plate made by the St. Chamond process contains nickel and chromium in addition to carbon.

Weight of Ore

What is the weight of iron ore per cubic foot?

Although handbooks give the weight of hematite ore as 325 pounds per cubic foot, the actual weight of this material in the condition in which it is charged into blast furnaces is much less. The railroads operating between the iron ranges of Minnesota and the docks at the head of Lake Superior have investigated this subject carefully and it has been found that an average weight of 140 pounds per cubic foot is fairly satisfactory for Minnesota ore in the condition in which it reaches the docks ready for loading into steamships.

Pig Iron Consumption

What is the consumption of foundry pig iron on the Pacific coast, and in ordinary times, what proportion of this iron is imported?

Figures compiled by *The Iron Trade Review* indicate that the annual consumption of foundry iron on the Pacific coast in 1913, the latest year for which satisfactory figures are available, was as follows: British Columbia, 9,000 tons; Washington, 25,000 tons; Oregon, 20,000 tons, and California, 90,000 tons. Of this amount about 120,000 tons was imported. The imported iron, in normal times, comes chiefly from four sources, China, Scotland, Germany and England.

Composition of Automobile Steel

What are the standard specifications for the highest and lowest carbon steels used in automobile construction?

There are a large number of steels used in automobile construction, but for the two limiting grades the specifications given below apply.

Low carbon automobile steels have the following analysis: Carbon, 0.10 per cent; manganese, 0.45 per cent; phosphorus, not over 0.045 per cent; sulphur, not over 0.05 per cent.

High carbon automobile steels have the following composition: Carbon, 0.95 per cent; manganese, 0.35 per

cent; phosphorus, not over 0.04 per cent; sulphur, not over 0.05 per cent.

Low carbon nickel steels have the following composition: Carbon, 0.15 per cent; manganese, 0.65 per cent; phosphorus, not over 0.04 per cent; sulphur, not over 0.045 per cent, and nickel, 3.50 per cent.

High carbon nickel steels have the following constituents: Carbon, 0.40 per cent; manganese, 0.65 per cent; phosphorus, not over 0.04 per cent; sulphur, not over 0.045 per cent, and nickel, 3.50 per cent.

Low carbon nickel-chrome steels have the following analysis: Carbon, not over 0.20 per cent; manganese, 0.65 per cent; phosphorus, not over 0.04 per cent; sulphur, not over 0.045 per cent; nickel, 1.25 per cent, and chromium, 0.60 per cent.

High carbon nickel-chrome steels have the following composition: Carbon, 0.50 per cent; manganese, 0.45 per cent; phosphorus, not over 0.04 per cent; sulphur, not over 0.04 per cent; nickel, 1.75 per cent; chromium, 1.10 per cent.

Low carbon chrome steels have the following composition: Carbon, 0.20 to 0.95 per cent, with manganese, 0.65 to 0.35 per cent; phosphorus, not over phosphorus, not over 0.04 per cent; sulphur, not over 0.05 per cent; chromium, 0.75 per cent, and silicon, 0.20 per cent.

High carbon chrome steels contain the following: Carbon, 1.30 per cent; manganese, 0.35 per cent; phosphorus, not over 0.03 per cent; sulphur, not over 0.03 per cent; chromium, 1.20 per cent.

Chrome-vanadium steels have the following composition: Carbon, 0.20 to 0.95 per cent, with manganese, 0.65 to 0.35 per cent; phosphorus, not over 0.04 per cent; sulphur, not over 0.04 per cent; chromium, 0.95 per cent, and vanadium, 0.18 per cent.

Silico-manganese steels have the following composition: Carbon, 0.50 to 0.60 per cent, with manganese, 0.70 to 0.60 per cent; phosphorus, not over 0.045 per cent; sulphur, not over 0.045 per cent. The silicon ranges from 1.95 per cent down to 1.65 per cent for the high carbon steel.

Limestone Deposits of West Virginia

BY G. P. GRIMSLEY

THE eastern Panhandle area of West Virginia near Martinsburg, 75 miles from Washington City, is a broad limestone valley. The limestone outcrops in upturned ledges which run in long parallel lines and have a trend 25 to 30 degrees east of north. These ledges are usually tilted at rather high angles, so that vertical quarry faces in this rock will, at a certain depth, pass through the high grade into the lower grade underlying limestones. The workable depth of the quarry depends on the thickness of the pure ledges and on the amount of dip.

Most of these limestones are more or less magnesian and are high in silica. However, belts of almost pure magnesian limestone or dolomite with only a trace of silica are found, as well as belts of limestone of low silica and high carbonate of lime. These latter will contain about 0.5 per cent silica and 98 per cent carbonate of lime. These low-silica limestones are desirable in iron and steel manufacture, and large quantities are shipped to Pittsburgh, Baltimore and Harrisburg.

Geologically, these low-silica limestones belong in the Upper Stones River formation of the Silurian. They are underlaid by the Middle and Lower Stones River limestones which contain more magnesia and silica. In the Martinsburg district, there are five distinct belts of this pure limestone. One extends from the Potomac river in Maryland southwest into Virginia, a distance of 25 miles. It varies in width from 200 to 260 feet and has been worked in quarries to a depth of 90 feet. Core drillings show good limestone at 130 feet. At the north end of this belt are the quarries of the Pittsburgh Limestone Co., which furnish stone to the Carnegie Steel Co. at Pittsburgh. Further south are the quarries and plant of the Security Lime & Cement Co. Near Martinsburg are the quarries of the Standard Lime & Stone Co., Baltimore, which ships to various furnaces. Near the south line of the county are the flux stone quarries of the J. E. Baker Lime Co., York, Pa. A considerable portion of this long belt is still undeveloped.

To the east of this belt is another long double outcrop of low-silica limestone, owned largely by the National Limestone Co., Scranton, Pa. This company has the largest crushing plant in the field and is the only one using steam shovels in quarry operations. Two miles east of Martinsburg is another double outcrop, the south end of which is operated for flux limestone and lime by the Jones & Laughlin Steel Co. Portions are owned by La Belle Iron Works, the Carnegie Steel Co. and the Standard Lime & Stone Co. Further east is a long undeveloped belt, extending from the Potomac river. Other shorter outcrops are found where the pure limestone has been brought to the surface by folding. Conservative estimates show that nearly 500,000,000 tons of limestone are available in these different belts. Over a million tons are shipped annually to steel companies. The demand for this grade of limestone comes from the open-hearth furnaces, where low-silica stone is required. It is also used in blast furnaces having a freight rate that is not too prohibitive. The district is reached by the Baltimore & Ohio, Western Maryland and Pennsylvania railroads. The distance to Baltimore is 100 miles, to Harrisburg 96 miles, and to Pittsburgh 230 miles. Electric power generated at plants on the Potomac and Shenandoah rivers is used by practically all the quarries.

The limestone varies in color from white or light gray and dove color to a bluish-gray and even black rock in certain ledges. This black rock is low in silica and burns to a white lime, the dark color probably being due to included organic matter. The limestone is hard, semi-crystaline in many ledges, and has been found to be very brittle.

Lists Rolled Products

The Interstate Iron & Steel Co., Chicago, has just issued a 72-page, cloth bound hand book listing the shapes and sizes of rolled products manufactured at its East Chicago and Marion works. The national iron and standard steel classifications as adopted December, 1895, and October, 1909, respectively, are given to assist the consumer in estimating the cost of iron and steel shapes, weights of which are to be found in tabular form throughout the book. The products of the East Chicago mill are principally iron and steel bars, shapes and tie plates, and at Marion rail carbon steel bars, angles, tees and other shapes, and plain and twisted reinforcing bars are made. In connection with the specifications of rail carbon steel, some suggestions regarding punches and dies to be used in punching the material are given. Several pages are devoted to harrow bars and special shapes for agricultural implements.

Interior Transverse Rail Fissures

Synopsis of Report Issued by Dr. P. H. Dudley of New York Central Lines—Fissures Are Due to Gagging

DR. P. H. DUDLEY, consulting engineer, New York Central lines, New York, has issued a report on the causes of induced interior transverse fissures in rail heads. The report, which is addressed to A. H. Smith, president of the New York Central system, undertakes to point out the cause and effect of interior transverse fissures, based on Dr. Dudley's experiments extending over the past several years. Frequent mention has been made of Dr. Dudley's work in the columns of *The Iron Trade* ment occur in the following order: The delayed transformations of the metal near the center of the head, and chemical or mechanical defects form the first contributory cause. This results in induced loss of strength, initial strains and physically a non-ductile core of heterogeneous metal near the center of the head. Mechanical injury to the heterogeneous metal, the nucleus checked by the gag, forms the second contributory cause. This results in an interior invisible portion of fractured metal near the of rail heads of physically homogeneous metal for the reason that they do not contain the conditions of the first contributory cause, consequently, while the metal is lengthened or shortened by the second contributory cause, it is not checked. Basic open hearth rails, made according to New York Central lines' specifications and rolled from reheated blooms, have not, to date, developed interior transverse fissures.

The specimens in my collection, after investigation, I classified by

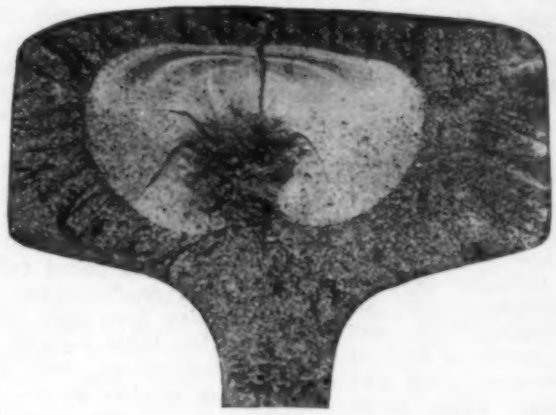


FIG. 1

FIG. 2

Fig. 1 shows an induced interior transverse fissure of the intergranular type. This rail, which was rolled Nov. 8, 1910, failed March 5, 1915. The nucleus is over ¼-inch in diameter, though smaller in a majority of the specimens. Three characteristic fractures of the metal appear in the final rupture of the section in the induced interior transverse fissure of the intergranular type. They are: (1) The nucleus checked between the grains of the metal by the gag. (2) The "detail" growth through the grains of the specular surfaces. (3) The final fracture of rupture. Fig. 2 shows a full size 100-pound A. S. C. E. rail that was rolled Feb. 23, 1911 and failed Jan. 3, 1916.

Review. The report, in part, follows: All my investigations show that interior transverse fissures in rail heads are induced by a combination of two or more exceptional conditions of manufacture in an occasional rail head by direct rolling, which can and should be avoided. Induced interior transverse fissures in basic open hearth rails are due in part to an occasional hot rail being cooled so rapidly by the rolls and their pressures to elongate the bar, or chilled by gusts of air before recalescence on the hot beds, as to cause a lag of some of the transformations of the metal in the interior of the head. Induced interior transverse fissures can only develop in the track from the effects of preceding causes, either of which is no longer a mystery, and their progressive stages of development occur in the following order: The delayed transformations of the metal near the center of the head, and chemical or mechanical defects form the first contributory cause. This results in induced loss of strength, initial strains and physically a non-ductile core of heterogeneous metal near the center of the head. Mechanical injury to the heterogeneous metal, the nucleus checked by the gag, forms the second contributory cause. This results in an interior invisible portion of fractured metal near the center of the head before the rail leaves the steel plant. Finally, the conditions of ordinary service for the interior fractured metal become abnormal. As a result, the checked interior metal in either type is no longer able to restrict the strains of the wheel loads within the usual range of the elastic limits of the steel, as in the case of sound metal, but there develops by "detail" growth, from and around the checks the specular surfaces of the induced interior transverse fissures until the section ruptures.

When the induced interior transverse fissures by growth crack through the metal to the air, the specular surfaces discolor and darken, as found in ruptured rails by the trackmen. Interior transverse fissures have not occurred in the countless thousands of rail heads of physically homogeneous metal for the reason that they do not contain the conditions of the first contributory cause, consequently, while the metal is lengthened or shortened by the second contributory cause, it is not checked. Basic open hearth rails, made according to New York Central lines' specifications and rolled from reheated blooms, have not, to date, developed interior transverse fissures.

The specimens in my collection, after investigation, I classified by June 9, 1915, into two general types, intergranular and coalescent. In the intergranular type the nucleus is in effect physically a non-ductile core in the head which is checked between the grains of the metal by the gag of the straightening press, and may be 5/8 inch in diameter, or as small as 1/8 inch. The subsequent development in the track of this type of interior transverse fissure from the checked nucleus is through the grains, a "detail" growth of specular surfaces, in striking contrast to the check between the grains, the effect of the blow of the gag. This type develops in rails or part of a rail, which cooled "low" on the "hot beds", and then gagged upon the base to shorten its metal and lengthen that of the head.

The coalescent type of fissure consists of a checked longitudinal ellip-

tical nucleus, the imprint of the gag on the non-ductile metal, ¼-inch to ⅜-inch under the bearing surface of the head which enlarges to a longitudinal fissure by the passing wheel loads. This fissure coalesces through a transverse, or oblique crack at the side of the maximum shearing stresses produced by the gag, and usually develops after two or more years of service in the track into the nearly vertical interior transverse fissure. The fracture is often conchoidal at the junction of the coalescence. The longitudinal fissure, and sometimes the vertical open on the gage side of the head, and can be discovered by careful inspection before rupture of the rail occurs in the track. This type develops in rails or part of a rail which cooled "high" on the "hot beds", and then gagged upon the head to shorten its metal and lengthen that of the base below the neutral surface of the section.

The rails in the track should be examined daily for cracks which break through to the outside of the metal, and when any are found, the rail should be removed. These cracks are not all alike in the various brands of rails, owing to the different methods of gagging.

To straighten the present stiff rails, the pressure of the gag is too severe on the metal for supports of only 42-inch spans, which I had increased from 30 inches in 1891, and since then no change has been made. Recent experiments show that with wider spans the rails can be straightened with less pressure of the gag and with consequent less injury to the metal, resulting in an improved line and smoother surface. The half moon breaks in the bases of rails are generally due to the locked up strains produced by the gag.

The Continental Motors Co. has acquired additional property at Muskegon, Mich., on which it will erect four and five-story buildings sufficient to double the present capacity of the plant. There are now 3,200 men on the payrolls and it is estimated with the new additions that 7,000 men will be employed at the plant.

The Reading Iron Co., Reading, Pa., has advanced the rate to its puddlers to $7 a ton, which is said to be the highest rate paid in many years in the Schuylkill valley.

The plant of the Adrian, Mich., Steel Casting Co. was almost completely destroyed by fire recently. The damage amounted to $30,000.

Ford Trucks

Will Be Made in Detroit—Extensive Additions Planned

Detroit, Aug. 14.—The Ford Motor Co., of Detroit, has announced that it will construct trucks. Plans are now being completed for this work and it is believed when the company gets started that it will manufacture 200,000 trucks a year. A thorough inspection of the field has been made and officials believe that the demand warrants its action. A big addition is now being constructed to the main plant and when all the additions planned are completed the company will give employment to more than 60,000 men. The present payroll carries the names of 20,000 persons.

Port Henry Ore

Now Being Shipped by Barge Down Hudson from Albany to New York

New York, Aug. 15.—Shipments of Port Henry iron ore, in quantity, consigned to eastern Pennsylvania furnaces now are being made by barge down the Hudson river from Albany to New York harbor. Under an arrangement made by Witherbee, Sherman & Co., Inc., with the New York & Western Canal Line, Inc., 59 Pearl street, New York City, two fleets of boats now are operating between Albany and Elizabethport, N. J., and will continue this traffic as long as river navigation is open. Each fleet consists of a steam power barge which is capable of carrying 200 tons and of four consorts each 98 feet long, 17 feet 6 inches beam and 11 feet in depth, with a capacity of 375 tons each. About 1,600 tons is regarded as a full fleet load. This movement by water has been going on for several weeks, and several fleet loads have been delivered. The ore is brought to Albany from Port Henry by rail and is loaded into the boats from coal trestles at the Church street wharf in Albany. At Elizabethport, the ore is delivered to the Central Railroad of New Jersey and shipped to furnaces in the Lehigh Valley and to other eastern Pennsylvania points. Each fleet has been making three trips monthly. The main object of the present shipments by water is to test out the possibilities which will be afforded when the enlarged Champlain canal from Port Henry to Albany is open to its full depth. It is expected that then large sized boats can be operated from the loading dock at Port Henry to Elizabethport at a much lower rate of freight than now obtains by the all-rail route. At present, the Champlain canal is open only to a 6-foot depth, and it is expected that it will be some time in 1917 before that waterway will permit of full navigation.

Toluol Market

Is Still Uncertain as to Prices—Benzol Inquiry is Active

New York, Aug. 15. — Until the large contracts for trinitrotoluol and picric acid now under negotiation with foreign governments are closed, the forward markets on toluol, chiefly, and to a large extent on pure benzol will not be determined. It is unsettled as yet what the foreign buyers will pay for their high explosives and until this condition is cleared up, the market on the crude products of the coke works will not be quotable accurately. On toluol, some of the makers are inclined to hold firmly for $4.50 per gallon; others are not so strong in their views. In addition to the very heavy inquiries for export which represent the principal feature of the market at present, some large quantities for domestic buyers also are being sought. One interest is attempting to cover on an unfilled contract involving 270,000 gallons and this inquiry has been generously distributed. Odd sales of spot toluol reflect an easier market condition and $4 per gallon is being done while there are reports of less being available.

The benzol market shows a heavy inquiry, but here as in the case of toluol, there has been no contracting as yet and the price of 70 cents per gallon now quoted is largely nominal. Resale offerings for spot are on a lower basis and sellers this week were willing to accept from 62 to 64 cents per gallon for a few cars which have been coming on the market unexpectedly. Solvent naphtha supplies continue easier, bringing more sales, but prices are holding unchanged.

After their recent heavy sales to the fertilizer manufacturers which have absorbed the greater part of their output for the next 12 months, makers of sulphate of ammonia are quoting higher prices. For contract from $3.35 to $3.45 per 100 pounds at tidewater and for spot around $3.50 now are quoted. New buying, chiefly for filling-in requirements, is light.

The current quotations per gallon at the maker's plant on leading coke oven by-products, are as follows:

Pure benzol, spot	$0.62 to .65
Pure benzol, contract	.70
Toluol spot	(market not defined)
Toluol, contract	(market not defined)
Solvent, naphtha, spot	.45
Solvent naphtha, contract	.40

Sulphate of ammonia is $3.35 to $3.45 per 100 pounds at tidewater for contract and $3.50 for spot.

Business News of Nation's Capital

Chamber of Commerce of the United States Discusses Business Conditions—Bascom Little Favors Large Navy

Bureau of *The Iron Trade Review*,
206 Corcoran Bldg.,
Washington, Aug. 15.

WHAT effect will the presidential campaign and election have on business? Now that the political pot is beginning to boil over and the November election day is less than two months off, this question is being raised in the minds of many business men.

It is answered thus in the latest statement on business conditions issued by the chamber of commerce of the United States:

"With the buying mostly for immediate needs and apparently little speculation, there appears to be almost an entire absence of any concern as to the effect upon business either of the presidential election, the possible coming peace in Europe, or any other factors of possible disturbance. Such is the opinion expressed by the committee on statistics and standards of the chamber of commerce of the United States, of which A. W. Douglas, of St. Louis, is the chairman. According to this authority, a campaign year need not be regarded with apprehension by the industrial and commercial interests of the country.

"Manufacturing is practically everywhere in excellent condition with factories full of orders, the committee reports, labor being fully employed and the products commanding high prices. The only exceptions are where strikes prevail.

"Mining of all kinds, in general, is in excellent shape. The principal exceptions to this are coal mines suffering here and there from strikes or lack of demand. In Southwestern Missouri and the neighboring sections of Arkansas, zinc and lead mines are feeling the result of the recent drop in the price of these metals.

"The building industry is reported to be in generally excellent shape. It is, in the opinion of the committee, the best barometer of general business since building in the country districts means the extensive use of materials in almost every line of commercial business. Despite the high prices of material, the building outlook continues good."

The fact that the estimated total wheat yield this year is between 465,000,000 and 475,000,000 bushels, or 30 per cent less than the 1915 yield and somewhat less than the average for the past ten years, is not expected by the committee to have a serious effect on general conditions.

Harding Makes Important Point

Washington, Aug. 15.—The possibilities of danger to the traffic on the Great Lakes in its relation to tramp steamers was brought out strikingly by Senator Harding, of Ohio, in the senate debate on the administration ship-purchase bill, which is scheduled for final passage this week.

Interrupting Senator Nelson, of Minnesota, in the latter's discussion of the section of the bill which requires owners of ships to file with the federal shipping board complete schedules of rates, Senator Harding asked the following question:

"I want to ask the senator whether, under the definition in this bill, a vessel engaged in ore trade, operating solely for its owners in carrying ore from Minnesota to Cleveland, would be a common carrier?"

Senator Nelson: "I think it would, if operated on a regular route."

Senator Harding: "Would a vessel which made a specific charter for a cargo from one shipper be a common carrier under the provisions of this bill?"

Senator Nelson: "I think it would be likely so held."

Senator Harding: "In order to bring out the question which is interesting me, suppose a vessel should charter a special cargo of goods at New Orleans to be carried to New York and the conditions were such that the vessel could offer an extraordinarily attractive rate to secure the cargo. Under the provisions of this bill, could that vessel be made to hold to that rate except under permission of the shipping board?"

Senator Nelson: "It would have to have a rate fixed and adhere to it and could be relieved from it by permission of the board, as I construe it."

Senator Harding: "Then a tramp vessel plying from one American port to another cannot pick up a cargo to its advantage as it may choose?"

Senator Nelson: "I think not."

Senator Harding, on the following day, Friday, delivered a speech in which he declared that the effect of the bill would not only be disastrous to American Great Lakes and coastwise shipping but might seriously injure the American ship building industry. Referring to the section of the bill which authorizes the shipping board to the "charter, lease or sell to any person a citizen of the United States any vessel so purchased, constructed or transferred," he said:

"There are no particularly qualifying provisions to that brief section. The board may prescribe the terms and conditions of charter, lease, or sale, and so long as the President perfunctorily approves, the charter or lease or sale goes through.

"Instead of an American investor in ships consulting with an American ship builder as to the kind and the cost of a ship he desires, he will search out the markets of the world for the type and size of a ship that best suits his requirements, have the federal shipping board accommodatingly buy it for him, and then sell it to him, or lease it, to engage in any trade.

"Why not? That is the reason for the creation of the federal shipping board. If it performs the functions it is appointed to perform, such a thing as I have just described is just what it will be called upon to do.

"And who will have a ship built in the United States at a price higher than he can have it built in a foreign country? Or who will buy an American-built ship when he can purchase a foreign-built ship more cheaply and put it in any trade—on the coast or the Great Lakes of the United States?"

Little's Appeal

Washington, Aug. 15.—A strong appeal for an adequate navy program has been sent to Chairman Padgett, of the house naval affairs committee, by Bascom Little, of Cleveland, chairman of the national defense committee of the chamber of commerce of the United States.

Mr. Little urges that the program finally adopted provide not less in number of new fighting vessels than is provided for by the navy appropriation bill as passed by the senate.

Iron and Money: Fact and Comment

Remarkable Earnings Statement of American Locomotive Co. Shows How One Equipment Company Has Profited From "War Orders"

IN MARKED contrast to the experiences of some of the other companies which engaged in the production of munitions as an extra line to their regular business, the American Locomotive Co. profited handsomely from its war contract with European governments during the fiscal year ended June 30. The annual report now made public shows the total net profits of the company for the year to have been $10,769,428 or an increase of $6,358,206 and 69 per cent over the previous banner year of 1906-1907. In the year ending June 30, 1915, the company reported a deficit of $1,491,980. The net profit for the year just ended is the equivalent of over 36 per cent on the common stock after the payment of the preferred disbursements.

The company has been following a very liberal policy both in depreciation allowances and in charging off the entire cost of the new equipment of all kinds made necessary for the production of munitions.

"In arriving at the profit of $10,769,428," says Chairman S. L. Schoonmaker, in his statement, "there has been deducted from earnings $1,761,682 for depreciation on all classes of property. There has also been charged against the profits for the year the entire cost of new equipment of every description purchased for use on munition work, together with the cost of alterations of plants in connection with such work. In addition to the foregoing a sufficient amount has been set aside from this year's earnings to provide for the cost of eventually restoring the two plants now making munitions to the best conditions for locomotive work when it is resumed at such plants."

The book value of the Rogers and Manchester plants was reduced heavily as these works are being dismantled.

Continuance of the excellent earnings record is promised by the statement of unfilled orders. The war contracts on the books on June 30 amounted to $41,642,905 and the locomotive orders on hand to $19,376,532.

The income account of the company, including that of the Montreal Locomotive Works, Ltd., compared with the previous years, is as follows:

	1915-16.	1914-15.
Gross earnings	$59,316,016	$9,303,298
Mfg., maint. and adminis. exp. and dep. incld. cost of equip. for munition orders.	48,245,582	10,445,900
	$11,070,433	*$1,142,601
Interest, etc.	301,005	349,378
Profit	$10,769,428	*$1,491,980
Divs. on prfd. stk. at 7 per cent.	1,750,000	1,750,000
Surplus	$9,019,428	*$3,241,980
Res. for adds. and bet.	3,000,000	.....
Net credit to profit and loss	$6,019,428	*$3,241,980

*Deficit.
†Decrease.

Iron and Steel Stocks

Quotations for leading iron and stocks at the close of the New York stock exchange on Aug. 12 and net changes for the preceding week are shown in the following table:

New York Stocks.

Quotations on leading iron and steel stocks at the close of the New York stock exchange on Aug. 12 and net changes for the preceding week are shown in the following table:

	Close Aug. 12.	Net chg.
American Can	56¾	+ 2¼
American Can, prfd.	111½	+ 1½
Amer. Car & Fdy.	59½	+ 2⅜
American Locomotive	72½	+ 4½
American Locomotive, prfd.	103⅜	+ 1⅜
American Steel Foundry	52¼	+ 2¼
Baldwin Locomotive	72⅞	+ 1½
Baldwin Locomotive, prfd.		
Bethlehem Steel	444	+14
Colorado Fuel & Iron	44¾	+ 1¾
Continental Can	99¾	+ 5¼
Crucible Steel	70¾	+ 2½
Crucible Steel, prfd.	116½	+ ⅜
General Electric	168¾	
Gulf States Steel.	73½	+ 1¼
Gulf States Steel, 1st prfd.	95	+ 5
Guld States Steel, 2nd prfd.	83	+ 3
International Harv. of N. J.	114	+ ⅜
Lackawanna Steel	71	+ 1
Nat'l. Enamel'g Stmp. Co.	23	+ 1
Pressed Steel Car	50¾	+ 3
Pressed Steel Car, prfd.	99⅞	+ 1⅛
Pullman Palace Car	163½	+ 3
Republic Iron & Steel	47¼	+ 1
Republic Iron & Steel, prfd.	111	+ 1
U. S. Cast Iron Pipe & Fdy.	19⅞	+ ⅜
United States Steel	87⅞	+ 1⅜
United States Steel, prfd.	118⅜	+ ½
Westinghouse Mfg.	58¼	+ 1¼

Following is a table comparing maximum quotations of iron and steel stocks not listed on the New York stock exchange, at the close Aug. 11 and Aug. 4:

Following is a table comparing maximum quotations of iron and steel stocks not listed on the New York stock exchange at the close, Aug. 11 and Aug. 4.

	Aug. 11.	Aug. 4.
American Radiator	.....	.....
American Ship Building	47⅞	42
Cambria Steel	45⅜	.....
Chicago Pneumatic Tool	67½	67½
LaBelle Iron Works	54	53¾
Lake Superior Corpn.	10¾	10¼
Stewart-Warner Speed. Co.	103½	102
Warwick Iron & Steel	.....	9¾
Westinghouse Air Brake	.....	.....
Westinghouse Elec. & Mfg.	58½	.....

Financial Crop Ends

The Newark Stamping & Foundry Co., Newark, O., manufacturer of aluminum and gray iron products, gas appliances and other goods, advises that a very favorable report was made for the quarter ending July 1 at the recent regular meeting of directors, an increase of 50 per cent in the quarter's business having been shown. A dividend of 3 per cent was ordered paid. Officers of the Newark company are: President, C. F. Sites; vice president and superintendent, F. W. Moser; secretary, H. J. Alexander; treasurer and general manager, E. F. Ball.

* * *

The Harbison - Walker Refractories Co., Pittsburgh, has declared the regular quarterly dividend of 1½ per cent on the common stock, and an extra dividend of 2 per cent, both payable Sept. 1 to stockholders of record Aug. 21.

* * *

Lucius Teter, president of the Chicago Savings & Trust Co., has been elected a director of the Advance Rumely Co., La Porte, Ind. Mr. Teter has accepted this position on the suggestion of eastern bankers interested in the reorganized company. These bankers are desirous of interesting western people in the company.

* * *

A Pennsylvania charter has been granted at Harrisburg to the John Roach & Co., to conduct a foundry and general iron and steel manufacturing business at Bridgeport, Montgomery county, Pa. The capital is $75,000; the incorporators are: Joseph H. Roach, Brookline, Pa.; B. F. Evans and Joseph C. Laird, Norristown, and Bertram C. Trimble, Philadelphia.

* * *

A new stove foundry is planned for Rockwood, Tenn., by a number of local business men. A charter already has been applied for, with a capital stock of $50,000. The principal stockholders are Sewell Howard and Harry Howard. The Mascot Stove Works, Chattanooga, also a stockholder, will furnish patterns. Its general manager will manage the Rockwood plant.

* * *

Stockholders of the Zimmerman Steel Co. at their recent annual meeting in Davenport, Ia., decided to increase the company's stock from $300,000 to $400,000. Half of the increase will be issued at once. President William C. F. Zimmerman stated that the increase would consist of 7 per cent cumulative preferred stock, participating with the common in earnings above 10 per cent. Directors of the company present at the meeting included President Zimmerman, H. L. Zimmerman, F. W. Zimmerman, C. V. McCloskey and J. W. Bettendorf.

* * *

The payment of 62 per cent dividends since Jan. 1 on the stock of the Scovill Mfg. Co., Waterbury, Conn., is a remarkable illustration of the huge profit some brass manufacturers are reaping from war orders. The company has a moderate capital and was well able to handle war business when it appeared. In addition, the concern's output of normal products, brass goods, expanded rapidly last year under foreign demand and increased domestic consumption, and the advantage obtained then has evidently been held.

Results of Control by Government

Taking Over of Plants and Control of Prices in England—People Are Patient and Patriotic, But Dissatisfaction is Increasing

BY JOSEPH HORTON

Office of *The Iron Trade Review*,
Prince's Chambers, Corporation Street,
Birmingham, Eng., Aug. 1.

ONE of the most important results of the great war in Europe has been an extensive measure of government intervention in Great Britain, effecting the business of iron and steelmaking at various points, and especially in the regulation of prices. It had been known for several months that the government was negotiating with manufacturers and various interests concerned, with a view to the regulation of pig-iron prices, and on April 7, an official declaration emanating from the authorities was issued through the press bureau, giving in detail maximum prices to be charged on pig iron.

This government control may be described as one of the minor revolutions introduced by the war, and traders are wondering how much of such control will survive the declaration of peace, whenever that much-desired consummation arrives. The patience with which these measures have been received by Britishers may be taken as the measure of their zeal in the prosecution of the war. They are determined to finish off the Germans, and so take with calmness an amount of government interference against which, to a man, they would have revolted in peace times. It is very unlikely that the government originally contemplated this serious addition to its burdens; but there has been a step-by-step progress, in which the area of inclusion has been an ever-widening circle.

The first serious step affecting the iron and steel trades was the price of coal (limitation) act which became law about the end of July last year. The effect of this was to fix the price for home consumers at 4s per ton in excess of the average for the year ended June 30, 1914. In addition to this, a stern hand was placed upon coal export orders.

Control of Steel Works

The form of government intervention which consists in the regulation of iron and steel prices was preceded by a much more drastic step, namely the taking over of the control of practically all the steel works in the kingdom, in addition to many metal-consuming establishments, such as those of constructive engineers, bridge builders, engineering works, etc., whose products were needed for the war. This step ran counter to all British tradition and prejudice, and at any other time would have been bitterly resented. It has, however, been accepted practically without complaint. At every iron and steel establishment, the Union Jack may be prominently seen floating over the works. Control has made very little difference to internal management; with this the government has not, generally speaking, meddled. But it has made all the difference to the destination of the works' products. Regular details are furnished with regard to customers in whose interests production is in progress, and these are tabulated under the heads of A, B and C. A is definitely a government product; the B class comprises material understood to be ultimately for war purposes; while the C class is reserved for the purely commercial customer. The government takes care that C gets no attention, until the wants of A and B are fully met.

At various times, the government has introduced sweeping measures regulating exports of iron and steel. A number of absolute prohibitions were the direct outcome of the defense of the realm act, and had for their object the prevention of pig iron, ferro-manganese, steel and other metals useful in war, finding their way directly or indirectly into the hands of the enemy. Latterly, this restriction has been managed by the system of licenses. The government tightened its hand upon this class of business about the middle of March last by the issue of a circular to manufacturers and merchants requiring that no further orders for the export of iron and steel were to be accepted without the trader first obtaining the permission of the ministry of munitions. The natural effect of this has been to shut down a considerable amount of export business. No doubt this is the deliberate intention of the order, in view of the undoubted fact that the supplies of iron and steel are hopelessly inadequate to meet the requirements both of the home and the foreign trade. The government honestly desires to interfere with the country's foreign business as little as possible. But it is simply a case of being unable both to "have one's cake and eat it."

Cleveland Prices

In fixing their maximum prices the government paid special attention to Cleveland, and at the beginning of March, when they announced the maximum at 82s 6d ($19.80) for Cleveland No. 3 the government prohibited speculative dealing in pig iron, steel and other metals. This happens to be a measure generally welcomed by legitimate traders, who for years have regarded the reckless and ignorant gambling by outsiders, including market gardeners, shopmen, clerks and tradesmen of all sorts, as one of the scandals of the business. The regulation in question prohibited sales, purchases, or offers, of iron, steel and other metals specified "unless in the case of a seller the metal to be sold is in the possession of the seller or is in the course of production for him or in the case of a buyer the purchase is made for or on behalf of the consumer." The difficulty of framing a regulation honestly seeking to get rid of what may be described as an unnatural and malignant growth was immediately apparent. A result certainly not desired by the authorities was the checking of legitimate merchants' business, through the obvious interpretation that forward transactions were expressly barred by this prohibition. This sinister result of the regulation was subsequently avoided by commonsense explanations on behalf of the authorities. It so happens, however, that the rapid disappearance of Cleveland stocks will remove the warrants which have served as gambling counters for the outside speculator banned by the government.

A great deal of government intervention has been applied to the coal trade, that industry of course, as well as the kindred one of coke, being intimately connected with the necessity of regulating the production of aniline dyes, and various other coal products. A good deal of confusion seems to exist in these matters, and the way in which government intervention is regarded by experts may be inferred from a statement made at a meeting of the Coke Oven Managers' Association at Sheffield at the end of February. G. Stanley Cooper, B. Sc., referring to the operations of the ministry of munitions said:

> "In connection with this and other matters of a similar nature introduced by the ministry of munitions to coke-oven people, it is high time that this department had someone to advise it who really understands by-product coking from the practical point of

view, and who realizes what some of the fantastic propositions put forward occasionally really mean when applied on the works. The by-product coking industry is one of the most important of the munition industries; yet as far as I am aware there is not a single practical coke oven man on the staff of the ministry of munitions, and we are absolutely at the mercy of amateurs, theorists and cranks whose sole qualification for the post they hold is an 'open mind' which at the same time is absolutely ignorant of the real points at issue. We know how the government has bungled things with regard to sulphate ammonia."

Profits Controled

Nothing quite so strong as this has been said in connection with the iron and steel trades, and practical men generally concede that the government has shown considerable desire to consult the various interests concerned, in the making of their regulations. It has also upon occasion shown a certain amount of sweet reasonableness, but it has a very difficult job on hand in the regulation of profits and prices. Practically, all the iron and steel producers are on the list of controled firms, so that higher prices and profits do not directly benefit the firms as much. Part of the difficulties that have arisen may be traced to the fact that iron prices and coke prices have not always kept step.

Apparently the authorities have been least successful in their handling of tin plate bars, sheet bars and other half-finished materials. Early in the year, the suggested maximum for Welsh sheet bars was £10 7s 6d ($49.80), yet it seems certain that makers are actually obtaining considerably above this, and a clear declaration appears to be called for, in regard to these products, on equally definite lines with those of pig iron. Another case of confusion seems to be that arising in connection with high-speed steel. Some time ago, the prices were fixed on the basis of 2s 10d per pound for steel containing 14 per cent tungsten, and 3s 10d per pound on the basis of 18 per cent tungsten. Obviously, this leaves the numerous other mixtures quite outside the regulation, and thus affords a good example of the inevitable difficulty attending price regulation in these technical matters.

Another pitfall undoubtedly has developed from the circumstances that the maximum prices in many cases only relate to goods sold at home while export prices are left untouched, the implication being that the government does not mind foreign buyers paying handsomely for whatever iron and steel and similar materials they take out of this country. While this imposes a kind of discouragement to the foreign buyer, it has a reverse influence upon the manufacturer, who obviously is under a great temptation to sell his wares to the most profitable customer. It seems very likely that further regulation will be called for, dealing with these anomalies.

Growing Dissatisfaction

The lapse of time, and extended experience of government control, do not make this new feature of British trade any more acceptable. There is an increasing distrust of government control, very fairly expressed by Lord Rhondda, better known as D. A. Thomas, one of the best known of British colliery owners. In connection with a recent proposal, the speaker said: "Personally I am not in favor of state financial aid to British trade, and would keep the state at arm's length, as far as possible. Business men cannot expect financial assistance from the state, without some corresponding supervision and control, and my experience of state control is that it is in inverse ratio to efficiency. State intervention means interference by party politicians, which heaven forbid—in my own buisiness at any rate."

Plenty of reasons could be given for this attitude. The South Wales Coal-owners have a bitter ground of complaint, that a recent 15 per cent advance in wages was given by the government to the South Wales miners, as the result of sheer intimidation by the men, and that the merits of the case were disregarded. It is agreed that the government has generally given way when the men have put on the screw, out of fear of the results of a strike, in a time of war. It is the feared effect of a strike which has been used to the fullest extent to put up wages. On the other hand, mine-owners have, largely, from motives of patriotism, refrained from driving a battle to extremes. So it has happened that, when the pinch has come, the employers have often come off second best. It is this patriotic element which upsets all general inferences to be drawn from present experiences of government control. With the employers, it is largely a question of peace-at-any-price. When the German menace has gone, this feeling will no longer operate.

The most important recent development, in the way of revising prices was the new list issued on July 7. In this, the ministry of munitions granted some small increases, generally very much below the amounts asked for. Broadly, pig irons were increased 5s, but at that time several Midland iron centers were excluded, much to their dismay, and their protest was so vigorous that the department gave way, and included these districts. If the concession had not been made, probably some of the smelters would have defied the government, by stopping their furnaces, much as their products are wanted.

The exceptions made to the prices awarded were highly significant. Makers were permitted to sell under five tons, at their own prices; also export orders and finished steel rolled from ingots, blooms or billets purchased from outside sources were excluded. The last named provision will put many mills quite outside the regulation, as they purchase the whole of their billets abroad. The general effect of this must be to encourage importation of American billets. It is, however, an essential provision, if commercial users of steel are not to be entirely excluded from buying material, since home made steel cannot be had—the government takes practically the whole.

Merchants are very much dissatisfied with a provision which allows them to add for profit and expenses only 2½ per cent to the maximum prices of finished steel, and 1¼ per cent to pig iron. This is said to be absurdly inadequate and adds to the feeling of the merchant that he has been deliberately selected by the government for victimization. For the first time, the ministry has included melting scrap, turnings and borings in the list of material. The trade does not believe that, in view of the many and varied qualities, this can be standardised, and failure is commonly predicted. There is a general complaint of a want of co-ordination between the government departments, of which many instances are given. The one merit of government control is that it has undoubtedly discouraged speculation and prevented the artificial inflation of prices resulting therefrom, and, it is hoped, will check the reactionary slump, which is expected after the war.

New Additions.—The Burt Mfg. Co., Akron, O., on account of greatly increased business, is just completing two large two-story additions to its plant in that city. It is purchasing considerable machinery, for which orders have been placed. This company heretofore has devoted its efforts exclusively to the manufacture and sale of oil filters, exhaust heads and ventilators, but in the near future will branch out into a general line of sheet metal work.

The Cement-Gun Construction Co., Chicago, reports that it is having a very busy summer. At the present time it is constructing 140 buildings of various sizes for a military training camp for the Canadian government, and has many other jobs on hand.

Slight Decline

In Unfilled Orders of the United States Steel Corporation

A falling off of only 46,866 tons in its order book resulted from the operations of the United States Steel Corporation during July, according to the monthly statement issued Aug. 10. This was considerably less than generally had been expected, as predictions had fixed the probable decline at much larger figure. The smallness of the decrease is attributed more to the reduced production in July caused by the heat, floods, holidays, etc., than any other factor. It has been officially stated that at certain periods of the month this contraction of output amounted to 10 per cent or more. The unfilled orders on hand at the end of July were 9,593,592 tons, compared with 9,640,458 tons on June 30.

The unfilled orders of the Steel Corporation at the close of each month in recent years, showing the changes in tonnage and per cent are as follows:

Date.	Total.	Change, tonnage.	Change, per cent.
July 31, 1916....	9,593,592	46,866—	.48—
June 30, 1916....	9,640,458	297,340—	3.09—
May 31, 1916....	9,937,798	108,247+	1.11+
Apr. 30, 1916....	9,829,551	498,550+	5.34+
Mar. 31, 1916....	9,331,001	762,035+	8.89+
Feb. 29, 1916....	8,568,767	646,199+	8.16+
Jan. 31, 1916....	7,922,767	119,547+	1.53+
Dec. 31, 1915....	7,803,220	616,731+	8.58+
Nov. 30, 1915....	7,189,489	1,024,037+	16.63+
Oct. 31, 1915....	6,165,453	847,834+	14.06+
Sep. 30, 1915....	5,317,618	409,163+	8.13+
Aug. 31, 1915....	4,908,455	20,085—	0.04—
July 31, 1915....	4,928,640	250,344+	5.35+
June 30, 1915....	4,678,196	413,598+	9.69+
May 31, 1915....	4,264,598	102,354+	2.46+
Apr. 30, 1915....	4,162,244	93,505—	2.21—
Mar. 31, 1915....	4,255,749	89,622—	2.06—
Feb. 28, 1915....	4,345,371	96,800+	2.28+
Jan. 31, 1915....	4,248,571	411,928+	10.74+
Dec. 31, 1914....	3,836,643	512,051+	15.40+
Nov. 30, 1914....	3,324,592	136,505—	3.94—
Oct. 31, 1914....	3,461,097	326,570—	8.62—
Sep. 30, 1914....	3,787,667	425,664—	10.01—
Aug. 31, 1914....	4,213,331	54,742+	1.32+
July 31, 1914....	4,158,589	125,732+	3.12+
June 30, 1914....	4,032,857	34,697+	0.86+
May 31, 1914....	3,998,160	278,908—	6.98—
Apr. 30, 1914....	4,277,068	376,757—	8.09—
Mar. 31, 1914....	4,653,825	372,615—	7.42—
Feb. 28, 1914....	5,026,440	412,760+	8.95+
Jan. 31, 1914....	4,613,680	331,572+	7.74+
Dec. 31, 1913....	4,282,108	114,239—	2.59—
Nov. 30, 1913....	4,396,347	117,420—	2.60—
Oct. 31, 1913....	4,513,767	490,018—	9.79—
Sep. 30, 1913....	5,003,785	219,683—	4.24—
Aug. 31, 1913....	5,223,468	175,888—	3.03—
July 31, 1913....	5,399,356	407,965—	7.03—
June 30, 1913....	5,807,317	517,005—	8.18—
May 31, 1913....	6,324,322	654,440—	9.38—
Apr. 30, 1913....	6,978,762	490,194—	6.55—
Mar. 31, 1913....	7,468,956	187,758—	2.45—
Feb. 28, 1913....	7,656,714	170,654—	2.18—
Jan. 31, 1913....	7,827,368	104,796—	1.32—
Dec. 31, 1912....	7,932,164	79,281+	1.01+
Nov. 30, 1912....	7,852,883	258,502+	3.40+
Oct. 31, 1912....	7,594,381	1,042,874+	15.33+
Sep. 30, 1912....	6,551,507	388,132+	6.29+
Aug. 31, 1912....	6,163,375	206,296+	3.46+
July 31, 1912....	5,957,079	149,773+	2.58+
June 30, 1912....	5,807,346	56,363+	0.98+

An unusually attractive booklet, "Personal Reminiscences of James Mapes Dodge," by Charles Piez, president of the Link-Belt Co., Philadelphia, has just been issued. This little book contains many interesting facts concerning the formation of the Link-Belt Co., its early history, struggles and successes. It also embodies a number of personal touches on the moving spirit behind the Link-Belt Co., the late James Mapes Dodge. The first part of the book deals with the development of the conveying and coal storage business and covers a period of Mr. Dodge's life down to about 1900. In the second part of the booklet, the author reveals the lasting influence of Mr. Dodge on the Taylor system of management at the time it was installed at the company's plant at Philadelphia. A number of inventions of Mr. Dodge are discussed. There are several illustrations and the general tone of the book lends much to its attractiveness.

Personals

S. T. Wellman, Cleveland, has gone to Oxbow, Me., for an extended sojourn.

Napoleon Petinot has severed his connection with the Titanium Alloy Mfg. Co., Niagara Falls, N. Y.

Douglas Walker, Chicago district salesman for the Snyder Electric Furnace Co., Chicago, has been appointed sales manager.

Wilfred D. Blood, export manager of the Hendee Mfg. Co., Springfield, Mass., has returned from a 11-months business tour of the orient.

E. W. Richey has been appointed assistant to President Geo. E. Van Hagen of the Standard Forgings Co., Railway Exchange building, Chicago, effective Aug. 1.

J. H. Regan, assistant secretary of the Pressed Steel Car Co., at New York, who has been in Petrograd for several months in the interest of his company, has returned to this country.

C. W. Price, safety expert of the industrial commission of Wisconsin since 1912, has resigned to accept a position as field secretary of the National Safety Council, with headquarters at Chicago.

C. H. McMillan, manager of the steel department of the Canada Cement Co. has resigned and is succeeded by C. Stendol, formerly with the Dominion Steel Corporation and the Algoma Steel Corporation.

President Richards has resigned from the American Saw Mill Machinery Co., Hackettstown, N. J., because of his conscientious objection to the manufacture of war material. Mr. Richards is now in Seattle, Wash.

T. H. Soren, for 23 years connected with the main works of the General Electric Co., Schenectady, N. Y., and for a number of years in an executive capacity, has become assistant to Vice President Samuel Ferguson, of the Hartford Electric Light Co., Hartford, Conn.

A. C. Garrison is now president of the Corrugated Bar Co., Buffalo, and the other officers are: A. L. Johnson, vice president and general manager; W. H. Kennedy, vice president and treasurer; R. McCarty, secretary; A. E. Lindau, manager of sales. These changes are effective Sept. 1.

William L. Doyle, sales manager of the insulated wire department, and Robert C. Da Costa, manager of the enameled wire department of the John A. Roebling's Sons Co., Trenton, N. J., have resigned to engage in the steel and wire business at Easton, Pa. Both have been connected with the Roebling company for several years.

Charles H. Cummins, superintendent of construction of the Toledo Ship Building Co., Toledo, O., who had been with the firm since the business was purchased from the Craig Ship Building Co., in 1905, has resigned, ill health being assigned as the cause. Mr. Cummins' service with the ship building plant he is now leaving was long and faithful, as he was with the Craig Ship Building Co., from the time the yard was opened. Ernest Hadrath, former assistant superintendent, who has been with the Craig Ship Building Co., at Long Beach, Calif., for the past five years, will succeed Mr. Cummins.

Satisfactory Results

The Anniston Ordnance Co. has just completed a satisfactory test at their electric furnace in Anniston, Ala., in the manufacture of ferromanganese in their 6-ton heroult furnace from Brazilian ore. This plant is located about 60 miles south from the manganese ore deposits of Georgia and further extensive tests are contemplated with domestic ores. Very few, if any, other tests have been made in the United States whereby the ferro-alloy has been reduced from the manganese oxide ore direct in the electric furnace.

The Standard Seamless Tube Co., Economy, Pa., will blow in two open-hearth steel furnaces, of 30-tons capacity each, Aug. 20. A 15-ton heroult electric furnace will be in operation after Sept. 10. The seamless tube department, which will have a capacity of about 100 tons a day, will not be in operation until about Oct. 1.

The Carnegie Steel Co., at its Waverly warehouses, outside of Newark, N. J., is erecting a one-story brick building which will be used as an emergency hospital. The structure will be 15 x 28 feet.

Tool Market Takes an Easy Slide

Domestic Buying Falls Off Along With Foreign Inquiry—Some Business Taken from Ship Yards—Railroad Lists Remain Inactive

THE eastern machine tool market reflects much less activity than a week ago. Not only has the wave of lathe buying, which was of gigantic proportions a week or two ago, practically come to an end, but the miscellaneous domestic demand for machine tools again has fallen off, and practically no important transactions were reported during the week. The New Departure Mfg. Co., Bristol, Conn., is in the market for some heavy requirements, and another Connecticut concern is inquiring for 50 large-swing lathes. Bids have gone in on an extensive list of equipment for the International Steel & Ship Building Co., Munsey building, Washington. No action yet has developed in regard to the list of equipment recently issued by the Bethlehem Steel Co. for its Sparrows Point, Md., plant. The E. W. Bliss Co., which last week was reported as having purchased 100 large-swing lathes, purchased about 120 of these machines, it is learned. There is practically no demand from the railroads. The New York Ship Building Co., Camden, N. J., and the Newport News Ship Building & Dry Dock Co., Newport News, Va., each has bought some additional equipment. The Fore River Ship Building Corporation, Quincy, Mass., again is in the market for some miscellaneous requirements. The Bethlehem Steel Co. has awarded a contract for two 175-ton ladle cranes and two smaller ladle cranes to the Alliance Machine Co., Alliance, O. The Pennsylvania railroad has placed a contract for a 40-ton gantry crane to be installed at East Liberty, Pa. Some fair orders for machine tools for export were placed during the week. They included a large number of lathes for shipment to Russia, and some good orders for lathes and miscellaneous equipment for France. There is very little buying at present from England and Italy. Prices on machine tools have undergone no further revision.

Bosch Magneto Co., Plainfield, N. J., is about to build an addition. General Electric Co., Schenectady, N. Y., has let a contract for the erection of an addition. American Locomotive Co. has let a contract for a large wheel shop at Schenectady, N. Y. Adriance Machine Co., Brooklyn, has let a contract for a 10-story plant to be used for the manufacture of hardware. Acme Pattern & Machine Co., Buffalo, has let a contract for a plant. Bell Motor Car Co., York, Pa., has let a contract for a plant to manufacture automobile bodies. Albro Clem Elevator Co., Philadelphia, contemplates building an addition. W. S. Rockwell Co., Newark, N. J., has commenced work on an addition to its new plant. Southard-Robertson Co., of which George W. Robertson, 257 Water street, New York, is treasurer, is about to build a stove and furnace manufacturing plant at Peekskill, N. Y.

Chicago Market Dull

TRADING in machine tools in the Chicago district is almost devoid of features. Export business, which seems to be strong in the east and which is echoed somewhat locally, is not particularly active, although an occasional lot of large lathes, 30 to 36-inch, is inquired for, and a few have been shipped for export. The volume of business is keeping up better than usual during midsummer, and is supported entirely by domestic users who are inquiring for single tools and small lots for a wide variety of purposes. Railroads are not putting out new inquiries and are buying sparingly from time to time on their former inquiries. Although the air is full of rumors that munition contracts are about to be placed in the Chicago market, apparently they are being taken by manufacturers already equipped to handle them, and demand for new machinery is not stimulated by this business.

Heavy Equipment in Demand at Pittsburgh

MACHINE tool dealers at Pittsburgh are receiving numerous inquiries for all types of equipment for shipment to rolling mills and machine shops in western Pennsylvania, eastern Ohio and West Virginia. The Carnegie Steel Co., Pittsburgh; the American Steel & Wire Co., Pittsburgh; the Jones & Laughlin Steel Co., Pittsburgh; the Cambria Steel Co., Johnstown, Pa., and the LaBelle Iron Works, Steubenville, O., have been buying new equipment for their machine shops. The Jones & Laughlin company is equipping a large shop to operate in connection with its new pipe mill at Woodlawn, Pa. The Monongahela railroad, whose shop at Brownville, Pa., was damaged by fire some time ago, has been buying lathes, slotting machines, grinding equipment and milling machines. Fairly heavy demand exists for second-hand equipment.

Cleveland Market Still Alive

THERE is little business of note in the Cleveland machine tool market. One local builder has been awarded a contract for about 200 machines for foreign shipment and the requirements of the Elyria Iron & Steel Co., Collinwood, and the American Clay Machinery Co., Bucyrus, O., have been closed with local dealers. The New York Central railroad, which inquired for an extensive list of equipment early in the year, has again asked for quotations on a number of tools. This carrier believed that better prices might be secured by not filling its needs when its list was first issued, but the opinion of local dealers is that the tools desired will be harder to obtain and that a higher price will be asked than earlier in the year. A number of inquiries are in the Cleveland market for milling machines, boring mills and grinders, but little business has resulted, due to lack of machines on sales floors to make immediate shipment.

Cincinnati Builders Making Good Deliveries

ACTIVITY in the Cincinnati machine tool market is at a lower ebb than a year ago. In August, 1915, deliveries could not be made before three or four months, but today it is not uncommon for machine tool manufacturers to take orders for shipment within a few weeks. No orders of importance are being placed with European nations, the field is limited almost entirely to domestic inquiries. The Enger Motor Car Co., Cincinnati, will need a large amount of equipment. This company has recently increased its capital stock to $4,000,000, and will double the capacity of its plant. The Cincinnati Planer Co., which has been in the market for several weeks for two 4-ton electric, hand-power cranes with 24-foot spans, has not purchased this equipment.

AGATHON STEELS

are made *for all purposes where dependable service is required.*
The *axles*, the *crank* and *drive shafts*, the *connecting rods* and all other parts of automobiles and auto-trucks of all descriptions that are subject to severe strains, should be made of *Agathon Steels.*
From the selection of raw materials, to the very last of the numerous processes necessary in attaining "Agathon" quality, we conduct exhaustive tests, to make positive that a state of perfection will be reached.
Furthermore, we preserve a test bar of every order we fill, thus insuring our patrons *exact* duplication of any metal they wish replenished.

MAKE IT OF "AGATHON"

OUR PRODUCTS

"AGATHON" Chrome Nickel
"AGATHON" Chrome Steel
"AGATHON" Chrome Vanadium
"AGATHON" Nickel Steel
"AGATHON" Special Analyses
"AGATHON" Vanadium
"AGATHON" Silico-Manganese
"AGATHON" High Carbon

THE CENTRAL STEEL COMPANY

MASSILLON, OHIO

Detroit Office:—
326-27-28 Ford Bldg., F. Walter Guibert, District Representative
Cleveland Office:—
Hickox Bldg. - The Hamill-Hickox Co., District Representative
Chicago Office:—
Room 1511-12 Lytton Bldg., 14 East Jackson Blvd.,
A. Schaeffer, District Representative
Philadelphia Office:—
902 Widener Bldg.,
Frank Wallace, District Representative

Say you saw it in THE IRON TRADE REVIEW

New Construction and Equipment

What it is **Where it is** **Who's doing it**

Among New England Factories

WINSLOW, ME.—The Proctor & Bowie Co. has been awarded a contract to build a large addition to the mill of the Hollingsworth & Whitney Co.

LEWISTON, ME.—The Maine Central Railroad Co. has awarded a contract to the F. W. Cunningham & Sons Co. for a brick and stone, 1½-story, 42 x 175-foot building to cost $50,000.

BOSTON.—Daniel P. Collins will build a brick, 7-story, 60 x 80-foot block to cost $55,000 at 23-29 Portland street.

BOSTON.—The Advance Machine Co. has been incorporated to make stamping machines with $150,000 capital by William E. Choate, Frederick Somes and Jesse W. Morton.

DEDHAM, MASS.—The Hodges Finishing Co. is building a brick, mill construction, 1-story, 60 x 104-foot addition to its mill on Bussey street.

FALL RIVER, MASS.—Steiger & Cox will build a brick, 2 and 4-story, 90 x 200-foot mercantile building.

HOLYOKE, MASS.—Work has been started on a 3-story, 133 x 217-foot mill for the Holyoke Valve & Hydrant Co., at 118 Race street.

LOWELL, MASS.—The City Iron Foundry Co. has been incorporated with $10,000 capital by A. J. Harris, James J. Norton and M. E. Harris.

LYNN, MASS.—The C. S. Cunningham & Sons Construction Co., Boston, has been awarded a contract to build a brick and stone, fireproof, 3-story and basement, 148 x 189-foot school for the city of Lynn to cost $150,000 on Conoma avenue.

NORTHAMPTON, MASS.—The Nonotuck Silk Co. will build a brick, 2-story, 40 x 66-foot storehouse in Florence.

QUINCY, MASS.—The Bay State Street Railway Co. will build a $70,000 brick addition to its power station in which five turbine engines will be installed.

REVERE, MASS.—The Revere Foundry Co. has been incorporated with $5,000 capital by Edward H. Tibbetts, George A. Lloyd, Chelsea, and D. Carey.

SPRINGFIELD, MASS.—George H. McClean has let a contract for a brick, 3-story, 22 x 100-foot addition to his mill building in the rear of 67 Dwight street.

EAST PROVIDENCE, R. I.—The Abrasive Machine Tool Co. has awarded a contract for a reinforced concrete, 1-story, 52 x 151-foot factory on Dexter street.

PROVIDENCE, R. I.—Henry Priest will build a 2-story, 40 x 60-foot storage building on Printery street.

PROVIDENCE, R. I.—The Atlantic Mills will build a brick and steel, 4-story, 37 x 39-foot addition to its plant on Manton avenue.

PROVIDENCE, R. I. — The Brown & Sharpe Mfg. Co. will build a brick and steel, 1-story, 72 x 170-foot factory in the rear of Leland and Promenade streets.

HARTFORD, CONN.—The Philbrick-Booth Foundry Co. has been organized with $15,000 capital by Halsey B. Philbrick, H. R. Philbrick, Thomas T. Booth and F. T. Williams, Worcester, Mass. It is building a foundry on Homestead avenue and will shortly begin business.

LITCHFIELD, CONN.—The Flynt Building & Construction Co., Palmer, Mass., has been awarded a contract for a brick, 3-story, 50 x 100-foot addition to cost $40,000 to the plant of the Bantam Anti-Friction Co.

NEW BRITAIN, CONN.—Bids close Aug. 25 for a brick, concrete and stone, fireproof, 2-story and basement, 120 x 135-foot school to cost $125,000 for the city of New Britain at Lee, North and Clark streets.

NEW HAVEN, CONN. — Yale University has awarded a contract to the H. Wales Lines Co., Meriden, for the construction of a brick and limestone, fireproof, 2-story and basement, 62 x 132-foot building to cost $160,000 at College and Wall streets.

NORWICH, CONN.—Plans have been figured for a brick and reinforced concrete, 3 and 4-story, 40 x 285-foot building to cost $130,000 for the state hospital for insane.

From the Alleghenies to the Sea

BUFFALO.—The Acme Pattern & Machine Co. plans to build a 2-story, 100 x 176-foot, factory, to cost about $50,000.

BUFFALO.—Sealed proposals will be received by the lighthouse inspector, Buffalo, for furnishing new boilers, boiler circulators and sludge removers for the lighthouse tender, Crocus.

CLIFTON, N. Y.—The American Concrete Steel Co., Newark, N. J., has been awarded contract for a 7-story factory building, 80 x 700 feet for the Louis De Jonge Co. The plant will cost $500,000.

LOCKPORT, N. Y.—The Niagara Emery Co. plans to build an addition to its plant to cost about $16,000.

SYRACUSE, N. Y.—Will & Baumer plan to build a 3-story addition, 70 x 178 feet, to cost about $300,000. G. L. Noble, Union building, is preparing the plans.

SYRACUSE, N. Y.—The Syracuse Gage & Valve Co. has been incorporated with $100,000 capital to manufacture gages, faucets, valves, etc. The incorporators are E. A. McDonald, H. J. Crane, H. E. Newell, Syracuse.

ARLINGTON, N. J.—The T. Geo. Stiles Co., manufacturer of railroad appliances, will build a 2-story, 24 x 45-foot plant addition.

BLOOMFIELD, N. J.—The Moriarite Mfg. Co. will erect a $20,000 plant at Bloomfield avenue and the Erie railroad. The structure will be 83 x 111 feet.

EAST ORANGE, N. J.—The Motor Compressor Sales Corporation has been incorporated to manufacture and deal in mechanical and electrical self-starters. The new company is capitalized at $125,000 by Charles O. Geyer, Felix R. Smith and Gordon Grand.

JERSEY CITY, N. J.—The city is contemplating the erection of a filtration plant to cost $1,250,000.

JERSEY CITY, N. J.—The International Elevator Co. has purchased a plot, 100 x 200 feet, between Morris and Essex streets upon which a new plant will be erected.

JERSEY CITY, N. J.—The White Tar Co. of New Jersey has been incorporated to manufacture alkalies and chemicals. The new company is capitalized at $50,000 and will build a plant on the Hackensack river near Kearney, N. J. The incorporators are Bryd Walker, Newark, Lorenzo S. Landers, 15 Fort Washington avenue, New York City, and Jacob J. Schench, 610 West 116th street, New York City.

NEWARK, N. J.—Abram W. Wheaton will erect a 2-story brick factory building at 167 New Jersey Railroad avenue.

NEWARK, N. J.—The Robinson-Roders Co. has taken out permit for a 2-story, brick boiler and storage room, 35 x 42 feet, to cost $4,000.

NEWARK, N. J.—F. H. Koenigsberger has plans for two 2-story factory buildings, 30 x 150 feet on South street, to cost $15,000.

NEWARK, N. J.—The Irvington Smelting Works has taken a permit to build a brick cupola building at 384 Nye avenue, to cost $12,900.

NEWARK, N. J.—The Central Dyestuff & Chemical Co. has contracted for two additional buildings at Plum Point lane, 65 x 70 feet and 50 x 100 feet.

NEWARK, N. J.—W. S. Rockwell Co., which recently completed a plant in Ball's lane, has commenced work on the erection of a 1-story, 56 x 82-foot building to be used as a storage for castings.

NEWARK, N. J.—The Reed Wire Specialties Co. has been incorporated to manufacture and deal in iron, steel, cement, etc. The new company is capitalized at $10,000 by William A. Costigan, Helen M. Costigan, Bloomfield, N. J., and Arthur F. Gallagher, Montclair, N. J.

NEWARK, N. J.—The American Synthetic Dyes, Inc., has taken out permits for several new buildings to cost $26,200. Structures will include frame storage 44 x 141 feet, two steel storage tanks, 20 feet in diameter; a 1-story, storage warehouse, 30 x 40 feet; a wash and

Telegram From

ROLLING MILL JIM

East Chicago Steel Co.,
East Chicago, Ind.

Still fishing. Having a great time. If you need any rolls, order from Hubbard.

So long—

Rolling Mill Jim.—

P. S. You couldn't ahad any trouble 'cause I 'aint had a telegram from you.

Hubbard Steel Foundry Co.
EAST CHICAGO, IND.
All Kinds of Iron and Steel Rolls and Steel Castings.

locker house, 27 x 75 feet and three steel tanks, 40 feet in diameter.

NEW BRUNSWICK, N. J.—The Netbourn Mfg. Co. will build a 2-story factory, 50 x 145 feet, at Commercial avenue and Talmadge street.

ORANGE, N. J.—The Lackawanna Railroad Co. will eliminate 26 grade grossings and elevate its road through the city of Orange.

PATERSON, N. J.—The Peerless Plush Co. will build a 2-story, 50 x 100-foot addition.

PATERSON, N. J.—Fred W. Wentworth, architect, 140 Market street, is preparing plans for a 4-story, 75 x 300-foot, factory building to be erected by the Paterson Industrial Development Co. at a cost of about $145,000.

PATERSON, N. J.—The Leslie & Elliot Co. has been incorporated to manufacture and deal in steam boilers, tanks, etc. The new company is capitalized at $125,000 by David Leslie, William Leslie, William Elliott and Henry smith.

PLAINFIELD, N. J.—The Bosch Magneto Co. South avenue, has taken out a permit for power house, 34 x 46 feet and a storage building, 38 x 80 feet, both to cost $30,000.

TRENTON, N. J.—The Jonathan Bartley Crucible Co. has let a contract for a 3-story brick addition on Oxford street to cost $22,000.

BRIDGEPORT, PA. — John Reach & Co. has been incorporated with $75,000 capital to manufacture iron and steel and conduct a foundry. The incorporators are Joseph Reach, Brookline, Pa., R. F. Evans and Joseph C. Lairs, Norristown, Pa., and Bertram C. Trimble, Philadelphia.

COLUMBIA, PA.—The Pennsylvania railroad is considering the construction of a bridge, one mile long, across the Susquehanna river between Columbia and Wrightsville. Alexander C. Shand, Philadelphia, is chief engineer.

DUNBAR, PA.—The American Manganese Mfg. Co. is in the market for a 42-inch gage, saddle tank locomotive weighing not over 13 tons.

McKEES ROCKS, PA.—The Carnegie Steel Co. plans to build a third unit to its Schoen Steel Wheel plant at McKees Rocks.

NEW CASTLE, PA.—The Johnson Bronze Co. is erecting an addition to its plant at a cost of $60,000. The building will be used as a foundry and will be of brick, concrete and steel construction, 50 x 150 feet.

OIL CITY, PA.—The American Steel Foundries is preparing plans for an additional building to be of structural steel, fireproof construction, and 85 x 100 feet.

PITTSBURGH.—The Edgewater Steel Co. has been incorporated with $10,000 capital by Charles M. Thorpe, George K. Warn and L. Pearson Scott, Pittsburgh.

PITTSBURGH.—The Fawcus Machine Co. is negotiating for a horizontal drilling, boring and milling machine, with floor plate complete having about a 60-inch horizontal and vertical movement, a 5-inch spindle, and a 48-inch feed for motor drive.

YORK, PA.—The Bell Motor Car Co. plans to build a 1-story factory, 108 x 240 feet. H. M. Stauffer is president of the company.

WILMINGTON, DEL.—Robeson Lea Perrot, architect, 34 South Seventeenth street, Philadelphia, has completed plans for several large buildings to comprise a chemical engineering laboratory which will be built at Wilmington for Francis I. DuPont, DuPont building.

WASHINGTON, D. C.—Bids will be taken soon by the bureau of supplies and accounts, navy department, for a horizontal boring, drilling and milling machine, and a vertical slotting machine. Schedule 9990.

WASHINGTON, D. C. — Sealed proposals will be received until Aug. 26 at the bureau of yards and docks, navy department, for furnishing 4-inch, flexible-joint, submerged pipe for the naval training station at San Francisco.

WASHINGTON, D. C.—The International Steel & Shipbuilding Co., Munsey building, has let a contract to the Kaucher & Hodges Co., Exchange building, Memphis, Tenn., for the erection of ship building shops, 1-story, 200 x 500 feet and a 2-story, 75 x 300 feet, costing about $750,000, and to be erected at Quantico, Va.

Activities in the Central States

AKRON, O.—The county commissioners have approved of a new bridge in Barberton, O., the estimated cost of which is $5,000.

AKRON, O.—The Commercial Printing Co. has applied for a permit to erect a $15,000 addition to its plant. The Bridge Water Machine Co. has applied for a permit to erect a $20,000 plant.

BUCYRUS, O.—The machine shop of the Carroll Foundry & Machine Co. was destroyed by fire with a loss of $100,000. The plant will be rebuilt at once.

CANTON, O.—The Carnahan Tin Plate & Sheet Co. is in the market for a large plate shear, having a blade not less than 100 inches in length.

CANTON, O.—The Letherman-Gehman Co. will start work in a few weeks on the erection of a 2-story, 40 x 135-foot, brick warehouse to cost $10,000.

CINCINNATI. — The Union Thread Co., Sixty-ninth street and the Big Four tracks Carthage, O., will construct an additional brick building, 40 x 150 feet, and add a story to its main building, 40 x 125 feet.

CLEVELAND.—Franz Warner, architect, 718 Hippodrome building, will receive bids soon for the erection of the warehouse for the Northern Ohio Traction Co., Akron, O. The structure will be six stories, 35 x 180 feet and will cost $50,000.

CLEVELAND. — The Osborn Engineering Co., Engineers' building, has completed plans and will receive bids on the erection of a garage and office building for the Adams Express Co. The structure will be 132 x 147 feet and will cost $40,000.

DEFIANCE, O. — The county commissioners have employed the Standard Engineering Co. to prepare plans for the proposed Brunnersburg bridge, the estimated cost of which is $2,000.

MARION, O.—The Power Mfg. Co. will build an 80 x 500-foot plant in Marion to cost $70,000.

STRUTHERS, O. — Johan Richards, city clerk, will receive bids for erecting a municipal building to cost $60,000.

TOLEDO, O.—The A. Bentley & Sons Co., contractors, has taken out a permit for the erection of a $35,000 factory for the Haughton Elevator Co. The proposed structure will be 1-story, 211 x 251 feet and 25 feet high.

TROY, O.—The county commissioners have decided to erect a steel and concrete bridge to cost $18,000 over the Stillwater river on the Gettysburg road.

WELLINGTON, O.—The Sterling Co. is building a 1-story, 26 x 40-foot addition to its No. 1 plant in which three automatic machines will be installed.

YOUNGSTOWN, O.—The Henderson Construction Co. will begin work this week on the construction of a filter plant for East Youngstown.

YOUNGSTOWN, O. — The American Tar Products Co. has completed plans for an extension to its plant, including the installation of a 10,000-gallon tar still, condensers and coolers, and a small naphthalene plant.

HUNTINGTON, W. VA.—The Gwinn Bros. Milling Co. has awarded the Burrell Engineering & Construction Co., 323 South La Salle street, Chicago, a contract for a 6-story grain elevator and office building to cost about $40,000.

HUNTINGTON, W. VA.—The Rum Creek Colleries & By-Products Co. has been incorporated with $250,000 capital by Fred C. Prichard, Rufus Switzer, R. H. Williams, F. M. Livezy, Huntington, and J. M. Vest, Switzer, W. Va. This company plans to open several new mines in Logan county.

MOUNDSVILLE, W. VA. — The United Zinc Smelting Corporation, Mercantile Trust building, plans to erect a plant consisting of an office building, 250 x 350 feet, a main building and chemical and tile factories of steel, brick and concrete construction, for smelting work and manufacturing chemicals. The estimated cost of the project is $1,500,000.

WHEELING, W. VA.—The United States engineers' office is receiving bids on gate operating machinery at dams Nos. 16 and 17, in the Ohio river.

WELLSBURG, W. VA.—The Wellsburg & Eastern railroad has been incorporated to construct a railroad from Wellsburg to the Pennsylvania line via Buffalo creek.

FRUITDALE, IND. — The Coey Auto School, C. A. Coey president, 2010 South Wabash avenue, Chicago, will build a 1-story automobile factory to cost $50,000.

GOSHEN, IND.—The National Dairy Machinery Co. is building an addition to its plant to cost $40,000.

HAMMOND, IND.—The Railway Motor Car Co. of America, with offices at 714 Westminster building, Chicago, has purchased the plant of the Fitz-Hugh-Luther Co., consisting of four buildings. As soon as $20,000 worth of machinery can be purchased the company will engage 200 men in the manufacture of gasoline motor-propelled passenger cars.

INDIANAPOLIS, IND.—The Universal Tool & Die Co. has been incorporated with a capitalization of $10,000 to manufacture metallic castings, machinery and dies. The directors are Charles J. McHugh, Edward W. Hohlt and Durward Rivers.

INDIANAPOLIS, IND.—Bids have been received for the erection of a 3-story reinforced concrete addition, 62 x 381 feet, to the plant of the National Motor Vehicle Co. A large craneway will be constructed. Clarence Martindale, Indianapolis, is the architect.

KENDALVILLE, IND.—The McCray Refrigerator Co. will build an addition to its tin and nickel plating shops and will install new equipment.

KOKOMO, IND.—The Haynes Stellite Co. will build a 1-story factory, 60 x 120 feet. J. C. Patton is the manager.

KOKOMO, IND.—The Progressive Motor

"OHIO SPECIAL"
Cold Drawn Seamless Steel Tubing

for
Ball Bearings and Roller Bearings
Our entire efforts are concentrated on Quality
"Made in Shelby" to any Special Analysis
Still the Same "Old Reliable"
If you require Quality give us a call
Fourteen Grades of Steels

THE OHIO SEAMLESS TUBE Co.
SHELBY OHIO

Saw you saw it in THE IRON TRADE REVIEW

Car Co. has been incorporated to manufacture motor cars. The company is capitalized at $50,000 by J. L. Sterling, E. C. Teter and Charles Goodfellow.

UNION CITY, IND.—The Union City Body Works, manufacturer of automobile bodies, is building a factory.

BARRY, ILL.—Bids will be received until Aug. 24 by the city clerk for water works improvements, including a pumping station, pumping equipment and cast iron pipe.

CHICAGO.—Norgaard & Christensen, 1616 North Campbell avenue, are building a 1-story machine shop to cost $10,000.

CHICAGO. — The Metal Specialties Mfg. Co., 736 West Monroe street, will build a 4-story factory, 100 x 140 feet, to cost $750,000

CHICAGO.—Paul Gerhardt, 65 West Randolph street, architect, is making plans for a 10-story hotel, reinforced concrete, 90 x 160 feet, to cost $400,000.

CHICAGO.—The Centaur Motor Co., B. R. Irving secretary, 2246 South Michigan avenue, will build a 2-story garage and machine shop, 80 x 150 feet, to cost $60,000.

CHICAGO.—The W. A. Jones Foundry & Machine Co. is completing its new plant costing about $200,000, including a foundry, 130 x 300 feet, a machine shop, 130 x 320 feet, a pattern shop, 76 x 92 feet, an office building, 80 x 80 feet, a warehouse, 80 x 100 feet, and a power house, 40 x 80 feet.

CHICAGO. — Henrich J. Freyn, Inc., engineer, Chicago, has taken contracts for the installation of Brassert-Bacon gas washing and drying units at blast furnace No. 7 of the Lackawanna Steel Co., at the Portsmouth, O., plant of the Whitaker Glessner Co. and for one stack at the Eliza furnace, Pittsburgh, for the Jones & Laughlin Steel Co.

EVANSTON, ILL.—Bids will be received until Sept. 8 by Irving A. Brower, commissioner of public works, for a steam pumping unit with a capacity of 10,000,000 gallons per day.

JOLIET, ILL.—The Moore Bros. are building a second addition, 1-story, 43 x 260 feet, for manufacturing stoves.

NORTH CHICAGO.—The Brown Portable Elevator Co., 10 South La Salle street, Chicago, will build a 1 and 2-story addition, 53 x 197 feet. F. D. Chase, 122 South Michigan avenue, is the architect.

SPRINGFIELD, ILL.—The Illinois Corrugated Metal Co. will be in the market shortly for equipment.

ADRIAN, MICH.—The steel plant of the Adrian Steel Casting Co. was damaged by fire with a loss of $40,000. The plant will probably be rebuilt.

CALUMET, MICH.—The Mohawk Mining Co. has broken ground for a new machine shop. The shop will be equipped with the latest type of tools and machinery.

DETROIT.—The Premier Machine Co. has been incorporated by W. A. Falk, M. Roskey and John J. Karcher.

DETROIT.—The Ideal Electric Co., 763 Gratiot avenue, manufacturer of gas and electric fixtures, will build a factory.

DETROIT.—The Detroit Steering Gear Co. has been incorporated to manufacture automobile steering devices with $5,000 capital by Frank Carrico, H. B. Lewis and H. S. Hall.

GRAND RAPIDS, MICH.—The Field Motor Co. will build a 1-story factory, 50 x 100 feet, for the manufacture of gasoline and kerosene engines.

HANCOCK, MICH.—The common council of Hancock has engaged B. N. Beattie to make a survey and estimates for the construction and equipment of a municipal electric light and power plant to cost $175,000.

JACKSON, MICH.—The Jackson Welding Co. will build a factory for the manufacture of automobile parts at a cost of $75,000.

SAGINAW, MICH.—The Jackson-Church-Wilcox Co. is building a factory for the manufacture of automobile steering gears.

ALGOMA, WIS.—The Ahnapee Veneer & Seating Co., Algoma is having plans prepared by DeLong & Son, architects, Appleton, Wis., for the general enlargement of its plant. One addition will be 32 x 50 feet, three stories and basement, and the other 48 x 52 feet, three stories. All of the new work will be of reinforced concrete and fireproof construction. M. W. Perry is the general manager.

BELOIT, WIS. — The Stewart-Warner Speedometer Co. is to convert its Beloit works into a malleable iron foundry and cast-

Business Changes, Consolidations and Expansions

Debevoise-Anderson & Co., 56 Liberty street, New York City, have been appointed exclusive sales agents for all coke for metallurgical purposes produced by the Seaboard Chemical Co., which is now erecting a Koppers by-product plant at Bergen Junction, N. J.

* * *

The production department of the Sanford Riley Stoker Co., Worcester, Mass., has been removed from the plant of the Norton Grinding Co. to Hyde Park, Boston.

* * *

The D. J. Long Machinery Co., Salem, Mass., has purchased factory buildings in Nashua, N. H., and will remove to that city.

* * *

The Associated Tanning Machinery Co., Salem, Mass., recently incorporated, has leased the new Creedon factory building on Highland avenue.

* * *

The New Departure Mfg. Co., Bristol, Conn., has purchased the Gridley house, a large hotel, at the cost of $30,000 for use in housing its employes.

* * *

The Standard Metal Works Co., Thomasville, Conn., has purchased the G. H. Bushnell Press Co.

* * *

The Griffin-Newberger Tobacco Co., North Bloomfield, Conn., has purchased the property of H. B. Beach & Son, manufacturers of tubular, marine and stationary boilers. The property consists of 90,000 square feet of land and five large brick buildings.

* * *

The Stege-Rindt Plating Co., Louisville, Ky., has changed its name to the Stege-Brassard Plating Works.

The Canadian Briscoe Co., a subsidiary of the Carriage Factories, Ltd., has taken over the plant of the Brockville Electric Light Co., Brockville, Ont.

* * *

The Huessner Engineering Co. has recently moved its Pittsburgh offices to the Oliver building.

* * *

The Motsinger Device Mfg. Co., Lafayette, Ind., has consolidated with the Poole Engineering & Machine Co. of Baltimore.

* * *

The Petroleum Iron Works, Sharon, Pa., has purchased a $20,000 site along the Erie and Lake Shore tracks to be used for future extensions.

* * *

The Daigle-Steger Iron Works of Detroit has changed its name to the Daigle Iron Works.

* * *

The A. P. Green Fire Brick Co., Mexico ,Mo., has opened sales offices in the following districts: Tulsa, Okla., in charge of George E. Ford, 312 Gallias building; Chicago, in charge of H. E. Risher, 208 South La Salle street; and St. Louis, in charge of Robert H. Miller.

* * *

The Gehl Bros. Mfg. Co., West Bend, Wis., has undertaken the manufacture of a new 25-horsepower, 4-cylinder gas-kerosene tractor.

* * *

The R. J. McGeehan Sons Co., De Pere, Wis., manufacturer of farm implements and machinery, has passed into the control of Elmer McGeehan.

* * *

The Cedarburg Foundry Co., Cedarburg, Wis., has been acquired by a concern represented by Frank A. Walsh and L. Hyde of West Allis, Wis.

BELOIT, WIS.—The Boone Tire & Rubber Co., Des Moines, Ia., a $500,000 concern, plans to establish a branch factory in Beloit, Wis., as soon as satisfactory arrangements can be made. A plant costing $25,000 is to be erected as the first unit of the new group.

MARINETTE, WIS.—Frank Wescher, Marinette and Menominee, Mich., has been awarded a contract for all the plumbing, heating, ventilating and vacuum cleaning installations in the new $175,000 high school at Menominee on a bid of $38,098.

MILWAUKEE.—The Everburn Heater Co., recently incorporated with $20,000 capital, will establish a plant to manufacture freight car heaters. C. H. Krebs, 751 Downer avenue, is interested.

MILWAUKEE.—O. A. Dieman, Waukesha, Wis., has been awarded a general contract for erecting the first unit of the new home for

feeble-minded at Union Grove, Racine county, Wis., on a bid of $168,900.

MILWAUKEE.—The general contract for erecting the new high school at Lake Linden, Mich., has been awarded to Bailey & Marsh, Minneapolis, Minn., at $165,000. It will be 110 x 180 feet, three stories and basement.

MILWAUKEE.—Herbst & Hufschmidt, architects, are taking bids for the erection of an annex to the foundry of the Jaeschke Bros. Foundry Co. at Cawker place and the Milwaukee tracks. It will be of brick and steel, 1-story, 50 x 100 feet.

MILWAUKEE. — Articles of incorporation have been filed by the Turbo Carburetor Co., Milwaukee, to manufacture a fuel making device for internal combustion engines. The firm is capitalized at $10,000 by Gladstone Cherry, M. L. Fykee and I. M. Smith.

MILWAUKEE.—Bids for the construction of the new plant of the Electric Steel Castings Co., Milwaukee, are now being taken by Mr. Baumgarten, 802 First National bank, Milwaukee. Plans have been completed by Brust & Philipp, architects, 506 Free Press building, and it is expected that work will be undertaken before Sept. 1.

MILWAUKEE. — The Milwaukee branch house of the Packard Motor Car Co. of Chicago, at Grand avenue and Thirty-fifth street, Milwaukee, will be enlarged at once by the construction of a 60 x 75-foot fireproof addition, to the machine shop. Plans are being completed by Brust & Philipp, 506 Free Press building. A hand power elevator will be installed.

MILWAUKEE.—Plans are being prepared by A. C. Eschweiler, Goldsmith building, for a large garage, machine and repair shop for the Wisconsin Telephone Co., on Clybourn street. It will be of brick, concrete and steel, two stories and basement, 100 x 432 feet, and will require several freight and passenger elevators and a complete machine shop equipment operated by individual electric motors. No date has been set for taking bids. W. D. Hobbins is the chief engineer.

MILWAUKEE.—Reports have been received in Milwaukee indicating a large movement in establishing new garages and erecting new buildings for garages and machine shops. Among the new buildings now being erected or projected are the following: J. H. Ford, Dodgeville, Wis., 50 x 129 feet; Miller-Myers Implement Co., Stanley, Wis., 38 x 116 feet, one story and basement; Floyd Ghastin, Sextonville, Wis., 30 x 100 feet; Charles Byse, Redgranite, Wis., 36 x 110 feet; Robert Robertson, Randolph, Wis., 46 x 116 feet; the Hoppe-Hatter Motor Co., 543 Broadway, Milwaukee, 60 x 120 feet, two stories and basement.

MONTICELLO, WIS.—The following contracts for $10,000 worth of equipment for the new municipal electric light and power plant were awarded by the village board: The Nordberg Mfg. Co., Milwaukee, 100-horsepower diesel oil engine, $4,800; the Allis-Chalmers Mfg. Co., Milwaukee, one 3-phase, 55-kilowatt generator and switchboard, $2,333; the General Electric Co., material and repairs for transmission lines, including poles, transformers, wiring, etc., $1,379.

OCONTO, WIS.—The W. E. Williams Co., Traverse City, Mich., manufacturer of hardwood flooring, will move its business to Oconto. It is planned to build a new mill at once, and plans have been prepared for a main building, 70 x 240 feet, one story and basement, an engine room and filing shop, 20 x 80 feet, a boiler and shaving room, 30 x 55 feet, and a dry kiln, 83 x 100 feet, in four compartments.

PORTAGE.—The Wisconsin Power, Light & Heat Co. will build a 1-story, auxiliary power plant costing $900,000. Woodmansee & Davidson, 208 South LaSalle street, Chicago, are the engineers.

PRAIRIE DU CHIEN, WIS.—The Prairie du Chien Woolen Mills Co. is building a large addition to its mill and will install 13 new looms, five spinning machines and one warper. All machinery will be operated by individual electric motors.

PRAIRIE DU CHIEN, WIS.—The county highway commission has awarded the contract for the new Mississippi river bridge at Prairie du Chien to the Deloss Engineering & Construction Co. at $8,431 for a concrete and steel structure.

SHEBOYGAN, WIS.—The city of Sheboygan will build a 600-foot viaduct on South Fourteenth street, of steel and reinforced concrete, to cost $50,000. C. U. Boley is the city engineer.

SHEBOYGAN, WIS.—The Wald Machine Co., manufacturer of automobile and bicycle specialties and general machinery work, has started work on the erection of its new machine shop, 80 x 100 feet, of reinforced concrete and brick construction.

KANSAS CITY.—The Bankers' Realty & Investment Co., R. M. Ward agent, 707 Commerce building, will build a 10-story hotel, 130 x 148 feet.

New Business in Eastern Canada

WABANA, N. F.—The Nova Scotia Steel & Coal Co., New Glasgow, N. S., proposes making extensive additions to its iron mines at Wabana, Newfoundland, and installing a quantity of new machinery and equipment. The equipment will include new hoisting machinery, boilers, pumps, a compressed air plant, power lines, a ventilating plant, etc. R. E. Chambers is manager of the mines.

BRANDON, MAN. — The city of Brandon will shortly be in the market for a 4,000,000-gallon, high-duty pump. A. W. Shaw is superintendent of the waterworks.

WINNIPEG, MAN.—The Manitoba Steel Foundries has been incorporated to manufacture iron, steel, machinery, tools, implements, etc. The new concern is capitalized at $300,000 by Peter J. Smith, Arthur M. Tirbutt, Horace Ormand and others of Winnipeg.

ALMONTE, ONT.—The town council will build a hydro-electric plant to cost $18,000. J. T. Kirkland is clerk of the council.

BRANTFORD, ONT.—The Dominion Steel Products Co. has been incorporated to manufacture steel, iron, machinery, tools, implements, etc. The concern is capitalized at $500,000 by Willoughby S. Brewster, George D. Heyd, Roy T. McGraw and others of Brantford.

BURFORD, ONT. — The Canadian Milk Products Co., Mail building, Toronto, will commence work at an early date on the erection of a large factory at Burford to cost $100,000.

COURTRIGHT, ONT.—The town council is having estimates prepared for the erection of a hydro-electric plant by the hydro-electric commission. R. G. Stewart is clerk of the council.

DUNDAS, ONT.—The John Bertram & Sons Co. is calling for tenders for the erection of a pattern shop.

HAMILTON, ONT.—The city council is having plans prepared for the erection of an addition to its waterworks plant to cost $70,000. James Blain is the engineer in charge.

HAMILTON, ONT. — The Gas Machinery Co., Cleveland, has secured a contract for supplying the machinery for the addition to be erected to the plant of the United Gas & Fuel Co., 141 North Park street, Hamilton, which will cost $75,000.

NEUSTADT, ONT.—C. W. Helwig & Son are in the market for a rotary pump, belt-drive, with a 1¼ or 1½-inch intake and a 1¼-inch discharge.

NEW TORONTO, ONT.—The town council will purchase a new pump to have a capacity of 600 gallons per minute for the waterworks plant. George D. Scott is clerk of the council.

OSAQUAN, ONT.—The Indian Lake Lumber Co. will develop a waterpower plant on the river at Osaquan and will be in the market for machinery, waterwheels, etc. F. F. Wilson is the superintendent.

PEMBROKE, QUE.—The Pembroke Electric Light Co. will erect a sub-station at Pembroke to cost $303,000.

PORCUPINE, ONT.—The Northern Canada Power Co. will install a new 4,000-horsepower water turbine in its plant at Wawaitin, Ont.

PORT HURON, ONT.—The Grand Trunk Railway Co. proposes to build railway shops at Port Huron and has approved of a bond issue of $750,000 for the purpose.

TORONTO.—The Fuller Construction Co. has been awarded a contract for the erection of a customs house and examining warehouse at Toronto to cost $1,500,000.

TORONTO.—The T. Eaton Co., Queen and Yonge streets, has received a permit for the erection of a large factory at Alice street and Downey's lane to cost $625,000. The building will be of reinforced concrete, fireproof construction.

WALKERTON, ONT.—The Canada Spool & Bobbin Co. will build a large addition to its plant and install new machinery.

WALKERVILLE, ONT. — The Canadian Bridge Co. has been awarded the contract for the steel girder bridge over the Nelson river at Kettle Rapid, Man., for the Hudson Bay railway at a cost of $325,000.

YORK TOWNSHIP, ONT.—The township council will build a waterworks system to cost $1,000,000. F. Barber, 57 East Adelaide street, Toronto, is the engineer.

MONTREAL.—William Hood & Son, 10 Richmond square, are in the market for a 10 to 15-horsepower electric motor, a heavy Bliss trimming or punching press, a power hack saw, and a 2,000-pound drop forge hammer.

MONTREAL.—The Modern Tool Mfg. Co. has been incorporated to manufacture tools, machinery, ammunition, shells, implements, etc. The new concern is capitalized at $200,000 by Ismael J. Sarault, Louis P. Renaud, Joseph Peloquin and others of Montreal.

SHERBROOKE, QUE.—H. G. James, White block, is preparing plans for the erection of a machine shop to cost $70,000.

SHIPSHAW, QUE.—R. S. Kelsch, Power building Montreal, is preparing plans for the installation of an additional twin-runner turbine of 5,000-horsepower capacity, with a penstock, generator and accessories to be installed in the plant of Price Brothers & Co., at Shipshaw.

MONCTON, N. B.—The Atlantic Underwear Co. will build an $8,000 addition to its plant and erect a steel water tank to cost $2,500.

SYDNEY, N. S.—The Sydney Foundry & Machine Co. will build a large marine repair shop and slip to be followed later by a dry dock. W. E. Clark is manager of the company.

IRON AND STEEL PRICES

Corrected up to Tuesday noon

PIG IRON

(Lower price to Jan. 1, 1917; higher to July 1, 1917.)	
Bessemer valley	$21.00
Bessemer, Pittsburgh	21.95
Basic, Pittsburgh	18.95
Basic, eastern Pa.	19.00 to 19.50
Basic, Buffalo	19.00 to 19.50
Malleable, Pittsburgh	19.45
Malleable foundry, Chicago	19.50
Malleable foundry, Philadelphia	21.00 to 21.50
Malleable foundry, Buffalo	18.50 to 19.00
No. 1X foundry, Philadelphia	20.00 to 20.50
No. 2 foundry, Pittsburgh	19.45
No. 2 foundry, Cleveland	18.50 to 19.00
No. 2 foundry, Ironton	18.50 to 19.00
No. 2 foundry, Chicago	19.00
No. 2X foundry, Philadelphia	19.50 to 20.00
No. 2X foundry, N. J. tidewater	19.50 to 20.00
No. 2X foundry, Buffalo	18.50 to 19.00
No. 2 plain, Philadelphia	19.00 to 19.50
No. 2 plain, N. J. tidewater	19.00 to 19.50
No. 2 plain, Buffalo	18.25 to 18.75
No. 2 southern, Birmingham	13.50 to 14.50
No. 2 southern, Cincinnati	16.40 to 17.40
No. 2 southern, Chicago	18.00 to 19.00
No. 2 southern, Phila. delivery	18.50 to 19.50
No. 2 southern, Cleveland	18.00 to 19.00
No. 2 southern, New York docks	18.00 to 18.50
No. 2 southern, Boston docks	18.25 to 18.75
No. 2 south. interior, New Eng.	19.00 to 20.00
No. 2 southern, St. Louis	18.40 to 18.90
Virginia No. 2X, furnace	18.50 to 19.00
Virginia 2X, Philadelphia	21.25 to 21.75
Virginia, No. 2X, Jersey City	21.00 to 21.50
Virginia 2X, Boston points	21.75 to 22.25
Gray forge, eastern Pa.	18.00 to 18.50
Gray forge, Pittsburgh	18.95
Gray forge, Birmingham	12.50 to 13.50
Silveries, 8 per cent, furnace	24.00 to 27.00
Silveries, 8 per cent, Chicago	31.50
Low phos. Standard, Phila.	33.00 to 34.00
Low phos. Lebanon, Pa. furnace	29.00 to 31.00
Low phos. Pittsburgh	30.00 to 31.00
Charcoal, Lake Superior, Chgo., Nos. 1 to 4	19.75 to 22.25
Charcoal, Buffalo	21.00 to 22.00
Charcoal, Birmingham	22.50 to 23.00

IRON ORE

Lake Superior Ores.
(Lower Lake Ports.)

Old range, Bessemer, 55 per cent, ton	4.45
Mesabi Bessemer, 55 per cent, ton	4.20
Old range non-Bess., 51½ per cent, ton	3.70
Mesabi non-Bess., 51½ per cent, ton	3.55

Eastern Ores.
(Per unit delivered eastern Pennsylvania.)

Pt. Henry fur., 60 per cent, unit	8.5c to 8.9c
Local N. Y. and N. J. ores, unit	8.5c to 8.75c
Port Henry lump, at mines, ton.	$4.00

Foreign Ores.
(Per unit Philadelphia.)
(Prices nominal.)

Foreign Bess., 50 to 65 per cent	8 to 8½
For'n non-Bess., 50 to 65 per cent	8 to 8½

COKE

(At the ovens.)

Connellsville furnace	$2.75 to 2.85
Connellsville fur., contract	2.40 to 2.50
Connellsville foundry, contract	3.15 to 3.40
Connellsville foundry	3.00 to 3.25
Wise county furnace, contract	2.85 to 3.25
Wise county foundry, contract	3.50 to 3.75
Pocahontas foundry, contract	3.25 to 3.75
Pocahontas furnace, contract	2.85 to 3.25
New River foundry, contract	3.75 to 4.25
New River furnace, contract	3.25 to 3.50

FERRO ALLOYS AND STEEL MAKING METALS

Ferro manganese, 80 per cent, seaboard, prompt	$170 to 175
Ferro manganese, 80 per cent, seaboard, contract	175
Spiegel, 20 per cent, fur. early and last half	45.00 to 50.00
Ferro-silicon, 50 per cent, Phil.	83.00 to 85.00
Ferro-silicon, 50 per cent, Pbgh.	83.00 to 85.00

Bessemer ferro-silicon, 9 per cent to 10 per cent, $32.00; 10 to 11 per cent, $33.00; 11 to 12 per cent, $34.00; 12 to 13 per cent, $35.00 a ton at the furnace at Ashland, Jackson and New Straitsville, O.

Ferro-carbon titanium, 8 to 12½ cents per pound in carloads.

SEMI-FINISHED MATERIAL

Open hearth billet, Phila.	$47.50 to 50.00
Forging billets, Phila.	65.00
Forging billets, Pbgh., nominal.	65.00 to 70.00
Forging billets, Chicago.	65.00
Wire rods, Pittsburgh (nom.)	55.00 to 60.00
Bessemer billets, Youngstown	45.00 to 46.00
Bessemer billets, Pittsburgh	45.00 to 46.00
Open hearth billets, Pittsburgh.	45.00 to 46.00
Open hearth billets, Youngstown	45.00 to 46.00
Bess. sheet bars, Youngstown	45.00 to 46.00
Op. h'th sheet bars, Youngstown	45.00 to 46.00
Bess. sheet bars, Pittsburgh	45.00 to 46.00
Open hearth sheet bars, Pbgh.	45.00 to 46.00
Muck bars, Pittsburgh (nominal)	40.00 to 45.00

SKELP

Grooved steel skelp	2.50c to 2.60c
Sheared steel skelp	2.90c to 3.00c

RAILS AND TRACK MATERIAL

(Gross tons.)

Stand. Bess. rails, Pbgh. & Chg. delivery after May 1, 1917	$33.00
Stan. op.-h'th rails, Pbg. & Chg. delivery after May 1, 1917	35.00
Light rails, 8 to 10 lbs., Pbgh.	50.00
Light rails, 8 lb., Chicago	43.00
Light rails, 12 to 14 lbs., Pbgh.	49.00
Light rails, 12 lbs., Chicago	42.00
Light rails, 16 to 20 lbs., Pbgh.	48.00

Freight Rates, Pig Iron

Mahoning and Shenango valleys to:—	
Cleveland	$0.95
Newark, N. J.	2.98
Boston	3.18
Philadelphia	2.78
Pittsburgh	.95
St. Louis	3.18
Buffalo to:—	
Albany, N. Y.	$1.26
New England (all rail)	2.58
New York and Brooklyn (all rail)	2.58
New York and Brooklyn (by canal)	1.25 to 1.60
Virginia furnaces to:—	
Boston docks (r. and w.)	$3.05
New England (all rail)	3.25
New York dock (r. and w.)	2.88
Birmingham, Ala., to:—	
Cincinnati	$2.90
Chicago	4.00
Cleveland	4.00
Louisville, Ky.	2.65
New York (all rail)	6.15
New York, (r. and w.)	4.25
Philadelphia (all rail)	5.20
Philadelphia (r. and w.)	4.00
Pittsburgh	4.90
Savannah, Ga.	2.75
Chicago to:—	
Des Moines	$2.80
Milwaukee	.50
Moline, Ill.	1.40
Omaha	3.58
St. Louis	1.58
Ironton and Jackson, O., to:—	
Chicago	$2.54
Cincinnati	1.26
Cleveland	1.62
Detroit	1.81
Indianapolis	1.58

Light rails, 16 to 20 lbs., Chgo.	$41.00
Light rails, 25 to 45 lbs., Pbgh	47.00
Light rails, 25 to 45 lbs., Chgo.	40.00
Relaying rails, standard, Pbgh. and Chicago	$23.00 to 24.00
Relaying rails, light, Chicago	24.00 to 25.00
Angle bars, st. sect., Pbgh. base	2.00c
Angle bars, st. sections, Chgo.	2.00c to 2.50c
Spikes, railroad, Pittsburgh	2.65c to 2.75c
Spikes, railroad, Chicago	2.75c to 2.90c
Track bolts, Pittsburgh	3.25c to 3.50c
Track bolts, Chicago	3.25c to 3.50c
Tie plates, Chicago	50.00 to 55.00

SHAPES, PLATES AND BARS

Structural shapes, Pbgh.	2.50c to 2.60c
Structural shapes, Philadelphia.	2.659c to 2.759c
Structural shapes, Chgo.	2.79c to 3.50c
Structural shapes, New York.	2.669c to 2.769c
Tank plates, Chgo.	3.19c to 3.60c
Tank plates, Pittsburgh (con.)	2.90c to 3.00c
Tank plates, Pittsburgh.	3.50c to 4.00c
Tank plates, Philadelphia.	3.159c to 4.159c
Tank plates, New York.	3.169c to 4.169c
Bars, soft steel, Chicago.	2.79c to 3.50c
Bars, soft steel, Pbgh.	2.50c to 2.60c
Bars, soft steel, New York.	2.669c to 2.769c
Bars, soft steel, Philadelphia.	2.659c to 2.759c
Hoops, carloads, Pittsburgh	2.75c to 3.00c
Bands, Pittsburgh	2.60c
Shafting, Pbgh., contr. carloads	15 to 20 off
Bar iron, Chgo.	2.35c
Bar iron, Philadelphia.	2.559c
Bar iron, Cleveland.	2.40c
Bar iron, New York.	2.569c
Bar iron, Pittsburgh.	2.65c to 2.75c
Hard steel bars, Chgo.	2.50c

SHEETS AND TIN PLATE

(Differentials indicated below are not now being closely followed.)

Bessemer.

BLUE ANNEALED SHEETS PITTSBURGH

	Per lb.
Nos. 3 to 8	2.95c to 3.20c
Nos. 9 to 10 (base)	3.00c to 3.25c
Nos. 11 and 12	3.05c to 3.30c
Nos. 13 and 14	3.10c to 3.35c
Nos. 15 and 16	3.20c to 3.45c

Bessemer.

BOX ANNEALED SHEETS, COLD ROLLED PITTSBURGH

Nos. 17 to 21	2.55c to 2.80c
Nos. 22 and 24	2.60c to 2.85c
Nos. 25 and 26	2.65c to 2.90c
No. 27	2.70c to 2.95c
No. 28 (base)	2.75c to 3.00c
No. 29	2.80c to 3.05c
No. 30	2.90c to 3.15c

Bessemer.

GALVANIZED SHEETS OF BLACK SHEET GAGE, PITTSBURGH

Nos. 10 and 11	3.25c to 3.50c
No. 12	3.35c to 3.60c
Nos. 13 and 14	3.35c to 3.60c
Nos. 15 and 16	3.50c to 3.75c
Nos. 17 to 21	3.65c to 3.90c
Nos. 22 and 24	3.80c to 4.05c
Nos. 25 and 26	3.95c to 4.20c
No. 27	4.10c to 4.35c
No. 28 (base)	4.25c to 4.50c
No. 29	4.45c to 4.70c
No. 28, black, Chicago	3.09c to 3.19c
No. 28 galvanized, Chicago	4.59c
No. 10, blue annealed, Phila.	3.159c to 3.659c
No. 10, blue annealed, Chgo.	3.19c to 3.29c
Tin plate, 100 lb., coke base	$6.00

IRON AND STEEL PIPE

(Prices Adopted July 24, 1916.)

Steel.

Butt weld:—	Black.	Galv.
⅛, ¼ and ⅜ in.	63	35½
½ in.	67	51½
¾ to 3 in.	70	55½
Lap weld:—		
2 in.	65	50½
2½ to 6 in.	68	53½
7 to 12 in.	65	49½
13 and 14 in.	53½	..
15 in.	51	..

Iron.

Butt weld:—	Black.	Galv.
⅛ and ¼ in.	52	24
⅜ in.	53	25
½ in.	57	38
¾ to 1½ in.	60	43
Lap weld:—		
1¼ in.	48	31
1½ in.	54	38
2 in.	55	39
2½ to 4 in.	57	42
4½ to 6 in.	57	42
7 to 12 in.	56	41

BOILER TUBES

Steel, 3½ to 4½ inches, l. c. l.	50 to 52
Iron, 3½ to 4½ inches, l. c. l.	40 to 42

WIRE PRODUCTS

(Retailers' price 5 cents above jobbers' quotations.)

Wire nails, jobbers', Pittsburgh	$2.60
Plain wire, jobbers', Pittsburgh	2.55
Galvanized wire, jobbers', Pbgh.	3.25
Polished staples, Pbgh.	2.75
Galvanized staples, Pbgh.	3.45
Barb wire, painted, jobbers' Pbgh.	2.75
Barb wire, galv., jobbers', Pbgh.	3.45

IRON AND STEEL PRICES

Corrected up to Tuesday noon

BOLTS AND NUTS

(Delivered within 20-cent freight radius.)

Carriage bolts, ⅜ x 6 inches, smaller or shorter, rolled thread, 50 and 10, cut threads, 50, larger or longer, 40.

Machine bolts with hot pressed nuts ⅜ x 4 inches, smaller or short, rolled 50, 10 and 5; cut, 50 and 5; larger or longer, 40 and 10.

Cold pressed, semi-finished hexagon nuts, 60 and 10.

Gimlet and cone point lag bolts, 50 and 10. Hot pressed square, blank or tapped nuts, $2.90 off list; hot pressed hexagon blank or tapped, $2.90.

Cold pressed square, blank or tapped, $2.60 off; hexagon, blank or tapped, all sizes, $3.00.

RIVETS

Structural rivets, Pbgh	4.00c
Structural rivets, Chgo. delivery	3.50c
Boiler rivets, Pbgh	4.10c
Boiler rivets, Chgo. delivery	3.60c

STEEL SHEET PILING

(Pittsburgh)

Base sizes	2.50c to 2.60c

STANDARD STEEL CHAIN

Chain, ⅜ inch proof coil	5.00c to 5.50c

COLD ROLLED STRIP STEEL

Base price 6.00c to 6.50c per 100 pounds, hard, coils 1½ inches and wider and by .100 inches and heavier.

Extra for Thickness.

0.100-inch and thicker	Base
0.050 to 0.099	$0.05
0.036 to 0.049	0.20
0.035	0.20
0.031 to 0.034	0.35
0.026 to 0.030	0.45
0.020 to 0.024	0.55
0.025	0.45
0.017 to 0.019	1.35
0.015 to 0.016	1.75
0.013 to 0.014	2.45
0.012	2.80
0.011	3.15
0.010	3.50

Other extras as per card of March 15, 1916.

CAST IRON WATER PIPE

Four-inch, Chicago	$33.50 to 34.00
Six-inch and larger, Chicago	30.50 to 31.00
Six-inch Class B, New York	30.50
Four-inch Class B New York	33.50
Four to six-inch Birmingham	28.00
Six-inch and larger Birmingham	25.00

Light weight water and gas pipe $1 per ton higher than standard water.

WAREHOUSE PRICES

Steel bars, Chicago	3.10c
Steel squares, 2-in. & ov., Cleve.	3.75c
Steel rounds, 2-in. & ov., Cleve.	3.75c
Steel bars, under 2 in., Cleveland	3.25c
Steel bars, Detroit	3.20c to 3.25c
Steel bars, Philadelphia	3.00c to 3.25c
Steel bars, New York	3.00c to 3.25c
Steel bars, St. Louis	3.15c
Steel bars, Cincinnati	3.20c to 3.75c
Steel bars, St. Paul	3.20c
Steel bars, over 2-in., Buffalo	4.20c
Steel bars, Buffalo	3.35c
Iron bars, Chicago	3.10c
Iron bars, Cleveland	3.20c
Iron bars, Detroit	3.20c to 3.25c
Iron bars, St. Louis	3.10c
Iron bars, Cincinnati	3.20c to 3.75c
Iron bars, Philadelphia	3.00c to 3.25c
Iron bars, New York	3.25c
Shapes, Chgo.	3.10c
Shapes, Detroit	3.20c to 3.25c
Shapes, St. Louis	3.15c
Shapes, St. Paul	3.20c
Shapes, New York	3.00c to 3.25c
Shapes, Cleveland	3.25c
Shapes, Philadelphia	3.00c to 3.25c
Shapes, Buffalo	3.35c
Shapes and plates, Cincinnati	3.20c to 3.50c
Plates, Chgo.	3.50c
Plates, Detroit	3.60c to 4.00c
Plates, St. Louis	3.55c
Plates, St. Paul	3.60c
Plates, New York	4.25c to 4.50c
Plates, Cleveland	3.65c
Plates, Philadelphia	4.00c to 4.25c
No. 10 blue anl. sheets, Chgo.	3.40c
No. 10 blue anl. sheets, Cleve.	3.50c
No. 10 blue anl. sheets, Buffalo	3.25c
No. 10 blue anl. sheets, St. L.	3.45c
No. 10 blue anl. sheets, Cinci.	3.40c to 3.50c
No. 10 blue anl. sheets, St. Paul	3.50c
No. 10 blue anl. sheets, Detroit	3.55c
No. 28 black sheets, Chgo.	3.20c
No. 28 black sheets, Cleveland	3.20c to 3.25c
No. 28 black sheets, Cinci.	3.25c to 3.40c
No. 28 black sheets, Detroit	3.50c
No. 28 black sheets, St. Louis	3.30c
No. 28 black sheets, St. Paul	3.35c
No. 28 galv. sheets, Chgo.	5.25c to 5.50c
No. 28 galv. sheets, Cleveland	5.25c
No. 28 galv. sheets, Cincinnati	5.25c
No. 28 galv. sheets, Detroit	5.00c
No. 28 galv. sheets, St. Louis	5.30c to 5.50c

Freight Rates, Coke

Connellsville district, per 2,000 lbs., to:—	
Baltimore	$1.80
Buffalo	1.85
Chicago	2.50
Cleveland	1.60
Detroit	2.10
East St. Louis	2.80
Joliet	2.50
Louisville	2.50
Milwaukee	2.85
New York	2.85
Philadelphia	2.05
Pittsburgh	.75
Richmond, Va.	2.94
Toledo	1.85
Valley Furnaces	1.20
Cincinnati	2.00

IRON AND STEEL SCRAP

(Net Tons.)

Angle bars, iron, Chicago	$18.75 to 19.25
Angle bars, steel, St. Louis	13.75 to 14.25
Arch bars and transoms, Chgo.	19.75 to 20.25
Arch bars and transoms, St. L.	19.75 to 20.25
Boiler plate, cut, No. 1, Chgo.	10.50 to 11.00
Boiler plate, cut, No. 1, St. L.	7.50 to 8.00
Boiler punchings, Chicago	13.50 to 14.00
Bundled sheet, Cincinnati	8.25 to 8.75
Busheling, No. 1, Chicago	12.00 to 12.50
Busheling, No. 1, Cincinnati	10.00 to 10.50
Busheling, No. 1, Cleveland	11.00 to 11.50
Busheling, No. 1, St. Louis	12.50 to 13.00
Busheling, No. 2, Chicago	8.50 to 9.00
Cast borings, Chicago	6.00 to 6.50
Cast borings, Cincinnati	4.50 to 5.00
Cast borings, Cleveland	6.00
Cast borings, St. Louis	6.50 to 7.00
Cast, No. 1, Chicago	11.75 to 12.25
Cast, No. 1, Cincinnati	11.50 to 12.00
Cast, No. 1, Cleveland	12.50 to 13.00
Cast, No. 1, St. Louis	11.25 to 11.75

Freight Rates, Finished Material

From Pittsburgh, carloads, per 100 lbs. to:—	
New York	16.9 cents
Philadelphia	15.9 cents
Boston	18.9 cents
Buffalo	11.6 cents
Baltimore	15.4 cents
Cleveland	10.5 cents
Cincinnati	15.8 cents
Chicago	18.9 cents
Detroit	15.7 cents
Minneapolis and St. Paul	32.9 cents
Denver	68.6 cents
St. Louis	23.6 cents
New Orleans	30 cents
Birmingham	45 cents
Pacific coast (all rail)	73.9 cents
Pacific coast (tin plate)	70 cents
Pacific coast, via Panama canal	61.9 cents

Cut forge, Chicago	13.75 to 14.25
Iron axles, St. Louis	25.50 to 26.00
Iron axles, Cleve	23.00 to 24.00
Knuckles, coup., Chicago	14.25 to 14.75
Knuckles, coup., St. Louis	14.50 to 15.00
Locomtive tires, Chicago	20.00 to 20.50
Locomotive tires, St. Louis	20.00 to 20.50
Machine shop turnings, Chgo.	5.50 to 6.00
Machine shop turnings, Cleve.	5.75
Machine shop turnings, Cincinnati	6.00 to 6.50
Machine shop turnings, St. L.	7.25 to 7.75
Malleable agricultural, Chgo.	11.00 to 11.50
Malleable agricultural, St. Louis	10.00 to 10.50
Malleable, Cincinnati	8.25 to 8.75
Malleable railroad, Chicago	11.75 to 12.25
Malleable railroad, St. Louis	11.00 to 11.50
Pipes and flues, Cleveland	11.25 to 11.50
Pipes and flues, Chgo.	10.75 to 11.25
Pipes and flues, St. Louis	10.50 to 11.00
Railroad wrought, No. 1, Chgo.	15.25 to 15.75
Railroad wrought, No. 1, Cleve.	15.00
Railroad wrought, No. 1, St. L.	15.50 to 16.00
Railroad wrought, No. 1, Cinci.	13.00 to 13.50
Railroad wrought, No. 2, Chgo.	14.00 to 14.50
Railroad wrought, No. 2, St. L.	14.50 to 15.50
Shafting, St. Louis	$17.00 to 17.50
Spring, St. Louis	13.50 to 14.00
Springs, Chicago	14.25 to 14.75
Steel car axles, St. Louis	28.00 to 28.50
Steel car axles, Chicago	28.50 to 29.00
Stove plate, Chicago	9.25 to 9.75
Stove plate, Cleveland	10.00
Stove plate, Buffalo	11.00 to 11.50
Stove plate, Cincinnati	8.75 to 9.25
Stove plates, St. Louis	8.00 to 8.50

(Gross tons.)

Axle turnings, Cleveland	$11.25 to 11.50
Busheling, No. 1, Buffalo	13.00 to 13.50
Busheling, No. 1, Pittsburgh	13.00 to 13.50
Busheling, No. 2, Buffalo	11.00 to 11.50
Bundled sheets, Pittsburgh	11.75 to 12.25
Bundled sheets, Cleveland	11.25 to 11.50
Bundled sheets, Buffalo	11.50 to 12.00
Car wheels (iron), Pittsburgh	13.50
Car wheels (steel), Pittsburgh	17.00
Car wheels, Chicago	12.00 to 12.50
Car wheels, eastern Pa.	15.50 to 16.00
Car wheels, Buffalo	13.00 to 13.50
Car wheels, N. Y.	13.50 to 13.75
Car wheels, St. Louis	12.25 to 12.75
Car wheels, Birmingham	10.50 to 11.00
Tram car wheels, B'ham	9.50 to 10.00
Cast borings, New York	7.00 to 7.50
Cast borings, eastern Pa.	10.00 to 10.50
Cast borings, Buffalo	8.00 to 8.25
Cast borings, Pittsburgh	7.50 to 8.00
Cast, No. 1, eastern Pa.	16.00 to 16.50
Cast, No. 1, Pittsburgh	14.00 to 14.25
Cast, No. 1, Birmingham	10.50 to 11.00
Cast, heavy No. 1, N. J. points	16.00 to 16.50
Forge, No. 1, eastern Pa.	12.50 to 13.00
Frogs, switches, guards, St. L.	15.00 to 15.50
Grate bars, Buffalo	11.50 to 12.00
Grate bars, N. J. points	11.25 to 11.50
Heavy axle turnings, Buffalo	12.00
Heavy melting steel, Pittsburgh	16.00 to 16.50
Heavy melting steel, Buffalo	15.50 to 16.00
Heavy melting steel, Chgo.	15.00 to 15.50
Heavy melting steel, Cleveland	14.75 to 15.25
Heavy melting steel, Cincinnati	14.50 to 15.00
Heavy melting steel, eastern Pa.	14.75 to 15.00
Heavy melting steel, New York	13.00 to 13.50
Heavy melting steel, St. L.	15.25 to 15.75
Heavy melting steel, B'ham	10.00 to 10.50
Iron rails, Chicago	18.50 to 19.00
Iron rails, Buffalo	18.00 to 18.50
Iron rails, Cincinnati	13.50 to 14.00
Iron rails, St. Louis	17.00 to 17.50
Iron rails, Cleveland	18.00
Iron axles, Pittsburgh	25.50 to 26.00
Iron axles, Cincinnati	20.00 to 20.50
Iron axles, eastern Pa.	27.00 to 28.00
Iron axles, Chicago	28.00 to 28.50
Iron axles, Buffalo	24.00 to 24.50
Low phos. steel, Buffalo	20.00 to 20.50
Low phos. steel, Pittsburgh	20.50 to 21.00
Low phos. steel, eastern Pa.	20.00 to 21.00
Machine shop turnings, Buffalo	7.00 to 7.50
Mch. shop turnings, New York	6.75 to 7.25
Mch. shop turnings, Pittsburgh	7.50 to 8.00
Mch. shop turnings, eastern Pa.	8.00 to 8.50
Malleable railroad, Cleveland	14.25 to 14.50
Malleable railroad, Buffalo	15.00 to 16.00
Malleable railroad, Pittsburgh	14.00
Malleable railroad, eastern Pa.	13.00 to 13.50
R. R. and mch. cast, No. 1 Bfl.	15.50 to 16.00
R. R. wrought, No. 1, Buffalo	17.25 to 17.75
R. R. wrgt., No. 1, eastern Pa.	20.00 to 20.50
R. R. wrgt., No. 1, New York	18.00 to 18.50
R. R. wrought, No. 1, Pbgh.	18.00 to 18.25
R. R. wrought, No. 1, B'h'm.	10.00 to 10.50
Reroll. rails, 5 ft. & ov., Pbgh.	16.50 to 17.00
Reroll. rails, 5 ft. & ov., Chgo.	15.50 to 16.00
Reroll. rails, 5 ft. & ov., E. P.	17.25 to 17.50
Reroll. rails, 5 ft. & ov., St. L.	16.25 to 16.75
Shafting, New York	20.00 to 20.50
Shafting, eastern Pa.	20.00 to 21.00
Shoveling steel, Chicago	14.25 to 14.75
Shoveling steel, St. Louis	14.00 to 14.50
Steel rails, short, Chicago	15.75 to 16.25
Steel rails, short, Cleveland	18.00
Steel rails, over 6 ft., Cleveland	14.50 to 15.00
Steel rails, old, B'h'm	10.50 to 11.00
Steel rails, short, St. Louis	15.25 to 15.75
Steel car axles, Birmingham	21.00 to 22.00
Steel car axles, New York	25.00 to 25.50
Steel car axles, Buffalo	24.00 to 24.50
Steel car axles, Cleveland	32.00
Steel car axles, Pittsburgh	26.50 to 27.00
Steel car axles, eastern Pa.	25.00 to 26.00
Stove plate, N. J. points	12.00 to 12.25
Stove plate, Birmingham	9.50 to 10.00
Stove plate, Pittsburgh	11.00 to 11.25
Stove plate, eastern Pa.	12.00 to 12.50
Wrought pipe, New York	10.25 to 10.75
Wrought pipe, eastern Pa.	12.50 to 13.00
Wrought pipe, Buffalo	12.00 to 12.50

"Where-To-Buy"

A classified-by-products list of advertisers for the convenience of readers. If you don't find what you want, write us and we will tell you where to get it. ¶ Index to advertisements will give you page number of any advertiser and by referring to advertisement you can get full particulars about products.

ACETYLENE IN CYLINDERS.
Linde Air Products Co., New York City.
Oxweld Acetylene Co., Chicago, Ill.
Prest-O-Lite Co., The, Indianapolis, Ind.

ACCUMULATORS.
Bethlehem Steel Co., The, So. Bethlehem, Pa.
Birdsboro Steel Fdy. & Mch. Co., Birdsboro, Pa.
Chambersburg Engrg. Co., Chambersburg, Pa.
Hydraulic Press Mfg. Co., Mt. Gilead, O.
Mackintosh, Hemphill & Co., Pittsburgh, Pa.
Mesta Machine Co., Pittsburgh, Pa.
Tod, Wm., Youngstown, O.
United Engrg. & Fdy. Co., Pittsburgh, Pa.
Wood, R. D., & Co., Philadelphia, Pa.

ACCUMULATORS.
(Hydraulic.)
Southwark Fdy & Mch. Co., Philadelphia, Pa.

AEROPLANE WIRE, STRAND AND CORD.
Roebling's, John A., Sons Co., Trenton, N. J.

ALLOYS.
American Vanadium Co., Pittsburgh, Pa.
Bethlehem Steel Co., The, So. Bethlehem, Pa.
Blackwell, Geo. G., Sons & Co., Ltd., Liverpool, Eng
Bourne-Fuller Co., The, Cleveland, O.
Carnegie Steel Co., Pittsburgh, Pa.
Central Steel Co., The, Massillon, O.
Titanium Alloy Mfg. Co., Niagara Falls, N. Y.
United Steel Co., Canton, O.

ALUMINUM ALLOYS.
United Smelt'g & Alum. Co., New Haven, Ct.

ALUMINUM.
(Granulated.)
United Smelt'g & Alum. Co., New Haven, Ct.

ALUMINUM.
(Solder.)
United Smelt'g & Alum. Co., New Haven, Ct.

ALUMINUM.
(Vanadium.)
American Vanadium Co., Pittsburgh, Pa.

ALUMINUM INGOTS.
United Smelt'g & Alum. Co., New Haven, Ct.

ALUMINUM RODS.
(Sheet.)
United Smelt'g & Alum. Co., New Haven, Ct.

ANGLES, TEES, CHANNELS.
(See Steel, Structural.)

ANNEALING BOXES AND POTS.
Mesta Machine Co., Pittsburgh, Pa.
Pittsburgh Annealing Box Co., Pittsburgh, Pa.
Pittsburgh Malleable Iron Co., Pittsburgh, Pa.
Pittsburgh Valve Foundry & Const. Co., Pittsburgh, Pa.
Swedish Crucible Steel Co., Detroit, Mich.
United Engrg. & Foundry Co., Pittsburgh, Pa.
Zanesville Malleable Iron Co., Zanesville, O.

ARMATURES.
Crocker-Wheeler Co., Ampere, N. J.
General Electric Co., Schenectady, N. Y.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

ASH BUCKETS.
Lakewood Engrg. Co., Cleveland, O.

AXLES.
American Bridge Co., New York City.
Bethlehem Steel Co., So. Bethlehem, Pa.
Cambria Steel Co., Philadelphia, Pa.
Carnegie Steel Co., Pittsburgh, Pa.
Illinois Steel Co., Chicago, Ill.
Lockhart Iron & Steel Co., Pittsburgh, Pa.
National Tube Co., Pittsburgh, Pa.
Otis Steel Co., Cleveland, O.

BABBITT METAL.
Keystone Bronze Co., Pittsburgh, Pa.
Lubricating Metal Co., The, New York City.

BAKERS, WIRE COATING.
Morgan Construction Co., Worcester, Mass.
Turner, Vaughn & Taylor Co., Cuyahoga Falls, O.

BALLS.
(Steel.)
Bethlehem Steel Co., The, So. Bethlehem, Pa.
New Departure Mfg. Co., Bristol, Conn.

BANDS.
(Steel.)
Carnegie Steel Co., Pittsburgh, Pa.

BARGES.
(Steel.)
American Bridge Co., New York City.

BARRELS, TUMBLING.
(Wire Nails.)
Turner, Vaughn & Taylor Co., Cuyahoga Falls, O.

BARS—ALLOY.
Central Steel Co., The, Massillon, O.

BARS.
(Concrete Reinforcing.)
Bourne-Fuller Co., Cleveland, O.
Cambria Steel Co., Philadelphia, Pa.
Carnegie Steel Co., Pittsburgh, Pa.
Cincinnati Iron & Steel Co., Cincinnati, O.
Franklin Steel Works, Franklin, Pa.
Inland Steel Co., Chicago, Ill.
Laclede Steel Co., St. Louis, Mo.
Ryerson, Jos. T., & Son, Chicago, Ill.
Trussed Concrete Steel Co., Detroit, Mich.
Upson Nut Co., Cleveland, O.

BARS.
(Iron and Steel.)
American Bridge Co., New York, N. Y.
American Iron & Steel Mfg. Co., Lebanon, Pa.
Belmont Iron Works, Philadelphia, Pa.
Bethlehem Steel Co., The, So. Bethlehem, Pa.
Bourne-Fuller Co., Cleveland, O.
Brown-Wales Co., Boston, Mass.
Carnegie Steel Co., Pittsburgh, Pa.
Cincinnati Iron & Steel Co., Cincinnati, O.
Franklin Steel Works, Franklin, Pa.
Harvey, Arthur C., Co., Boston, Mass.
Illinois Steel Co., Chicago, Ill.
Illinois Steel Co., Warehouse Dept., Chicago, Ill
Illinois Steel Warehouse Co., St. Louis, Mo.
Illinois Steel Warehouse Co., St. Paul, Minn.
Inland Steel Co., Chicago, Ill.
Jones & Laughlin Steel Co., Pittsburgh, Pa.
Lackawanna Steel Co., Buffalo, N. Y.
Lockhart Iron & Steel Co., Pittsburgh, Pa.
Milton Mfg. Co., Milton, Pa.
Republic Iron & Steel Co., Youngstown, O.
Ryerson, Joseph T., & Son, Chicago, Ill.
Scully Steel & Iron Co., Chicago, Ill.
Standard Gauge Steel Co., Beaver Falls, Pa.
Tennessee Coal, Iron & R. R. Co., Birmingham, Ala.
Trussed Concrete Steel Co., Detroit, Mich.
United Steel Co., Canton, O.
Upson Nut Co., Cleveland, O.

BEAMS, CHANNELS AND ANGLES.
Belmont Iron Works, Philadelphia, Pa.
Bethlehem Steel Co., The, So. Bethlehem, Pa.
Bourne-Fuller Co., Cleveland, O.
Cambria Steel Co., Philadelphia, Pa.
Carnegie Steel Co., Pittsburgh, Pa.
Franklin Steel Works, Franklin, Pa.
Illinois Steel Co., Chicago, Ill.
Scully Steel & Iron Co., Chicago, Ill.

BEARINGS.
(Ball.)
New Departure Mfg. Co., Bristol, Conn.

BEARINGS.
(Vanadium Steel.)
American Vanadium Co., The, Pittsburgh, Pa.

BELLS.
(Marine and Locomotive.)
Vanduzen, E. W., Co., The, Cincinnati, O.

BELT CEMENT AND DRESSING.
Graton & Knight Mfg. Co., Worcester, Mass.
Texas Company, The, New York City.
Williams, I. B., & Sons, Dover, N. H.

BELT LACING.
(Leather.)
Chicago Rawhide Mfg. Co., Chicago, Ill.
Graton & Knight Mfg. Co., Worcester, Mass.
Williams, I. B., & Sons, Dover, N. H.

BELTING.
(Chain.)
Link-Belt Company, Chicago, Ill.

BELTING—LEATHER.
Chicago Rawhide Mfg. Co., Chicago, Ill.
Graton & Knight Mfg. Co., Worcester, Mass.
Williams, I. B., & Sons, Dover, N. H.

BENCHES.
(Steel.)
New Britain Mach. Co., New Britain, Conn.

BENCHES AND FRAMES.
(Drawing.)
Morgan Construction Co., Worcester, Mass.
Turner, Vaughn & Taylor Co., The, Cuyahoga Falls, O.

BENDING AND STRAIGHTENING MACHINES.
Abramsen Engrg. Co., Pittsburgh, Pa.
Bertsch & Co., Cambridge City, Ind.
Birdsboro St'l Fdy. & Mch. Co., Birdsboro, Pa.
Cleveland Punch & Shear Works Co., Cleveland, O.
Covington Machine Co., Covington, Va.
Espen-Lucas Machine Works, Philadelphia, Pa.
Hinman, D. A., & Co., Sandwich, Ill.
Hydraulic Press Mfg. Co., Mt. Gilead, O.
Mackintosh, Hemphill & Co., Pittsburgh, Pa.
Niles-Bement-Pond Co., New York, N. Y.
United Engrg. & Fdy. Co., Pittsburgh, Pa.

BENZOL RECOVERY PLANTS.
Koppers, H., Co., Pittsburgh, Pa.

BILLETS.
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., The, So. Bethlehem, Pa.
Bourne-Fuller Co., Cleveland, O.
Cambria Steel Co., Philadelphia, Pa.
Carnegie Steel Co., Pittsburgh, Pa.
Central Steel Co., The, Massillon, O.
Illinois Steel Co., Chicago, Ill.
Inland Steel Co., Chicago, Ill.
La Belle Iron Works, Steubenville, O.
Lackawanna Steel Co., Buffalo, N. Y.
Otis Steel Co., Cleveland, O.
Republic Iron & Steel Co., Youngstown, O.
Tennessee Coal, Iron & R. R. Co., Birmingham, Ala.
Upson Nut Co., Cleveland, O.
Whitaker-Glessner Co., Portsmouth Works, Portsmouth, O.
Wood, Alan, Iron & Steel Co., Philadelphia.
Youngstown Sheet & Tube Co., Youngstown.

BLAST FURNACE SKIP CARS.
Lakewood Engrg. Co., Cleveland, O.

BLAST FURNACE TUYERES.
Keystone Bronze Co., Pittsburgh, Pa.

BLAST FURNACE VOLUME METERS.
Clark, Chas. J., Chicago, Ill.

BLOCKS.
Bethlehem Steel Co., The, So. Bethlehem, Pa.

BLOOMS.
Bethlehem Steel Co., The, So. Bethlehem, Pa.
Bourne-Fuller Co., Cleveland, O.
Cambria Steel Co., Philadelphia, Pa.
Carnegie Steel Co., Pittsburgh, Pa.
Hillman, J. H., & Sons, Pittsburgh, Pa.
Illinois Steel Co., Chicago, Ill.
La Belle Iron Works, Steubenville, O.
Lackawanna Steel Co., Buffalo, N. Y.
Tennessee Coal, Iron & R. R. Co., Birmingham, Ala.
Upson Nut Co., Cleveland, O.
Wood, Alan, Iron & Steel Co., Philadelphia.
Youngstown Sh't & Tube Co., Youngstown, O.

See Index to Advertisements for Pages Containing Advertisements of Companies Listed Above